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ABSTRACT

This report presents national statistics concerning professional and technical personnel in the sciences and engineering employed at institutions of higher education in January 1975. Part I contains employment statistics for scientists, engineers, graduate students, and technicians at universities and colleges; Part II contains statistics for scientists, engineers, and technicians employed at federally funded research and development centers. The statistics cover such topics as field of employment, employment trends, type of institution, type of control, sex distribution, and geographical distribution. Appendices include notes on general methodology, detailed statistical tables, and a reproduction of the questionnaire by which data were collected. (MH)

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Manpower Resources for Scientific Activities at Universities and Colleges January 1975

Surveys of Science Resources Series
National Science Foundation
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Related Publications

REPORTS	NSF No.	Price
Graduate Science Education: Student Support and Postdoctorals, Fall 1974	76-313	In press
Expenditures for Scientific and Engineering Activities at Universities and Colleges, Fiscal Year 1974	76-303	$1.15
Detailed Statistical Tables. Manpower Resources for Scientific Activities at Universities and Colleges, January 1975	75-329	—
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HIGHLIGHTS		
"Employment of Academic Scientists and Engineers Increases from January 1974 to January 1975"	75-331	—

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FOREWORD

The seventies are a period of difficult choices for many institutions of higher education. The rapid increase in employment of academic faculty that characterized the sixties has slowed down drastically in the face of financial stringencies. Many factors contributed to these fiscal constraints, including spiraling inflationary conditions, leveling-off of Federal research funding in various scientific fields, and curtailment of Federal grants for fellowships and traineeships. In attempts to reduce operating budgets, academic administrators employed many more part-time professionals and reviewed their policies pertaining to faculty tenure.

In addition to economic problems, higher education personnel practices have been greatly influenced by social forces. Today, emphasis is being placed on equal employment opportunities. This report reflects this emphasis by showing that employment of women scientists and engineers increased at nearly triple the rate of men between 1974 and 1975.

The Survey of Scientific and Engineering Personnel Employed at Universities and Colleges is the single source of national statistics on annual employment characteristics of academic scientists and engineers. Through analysis of the data, a picture is obtained of current and changing patterns in the employment and utilization of professional and technical personnel, one of the principal indicators of the status of academic science. Since institutions of higher education are the major performers of the Nation's basic research, the level and characteristics of scientific employment directly impact on progress toward the solution of future technological problems, particularly those of a long-term nature.

The Foundation wishes to acknowledge with deep appreciation the excellent cooperation of university and college officials in responding to the survey. The report was prepared in the Division of Science Resources Studies, Charles E. Falk, Director.

H. Guyford Stever
Director
National Science Foundation

May 1976

general notes

- The data presented in this report are based on the NSF survey of professional and technical personnel in the sciences and engineering employed at institutions of higher education in January 1975. A separate document, which included 58 detailed tabulations from the survey, was issued in November 1975. For the title of that document and other related reports, see the list of *Related Publications* shown on the inside of the front cover of this report.

- Of 2,230 institutions included in the 1975 survey, the number of respondents was 1,818, or 82 percent; NSF provided estimates for the remaining 412 nonrespondents as noted in appendix A, technical notes. Among the 293 doctorate-granting institutions, which account for more than two-thirds of total employment of academic scientists and engineers, the response rate was 95 percent. The high response rate for the larger institutions accounted for relatively low rates of estimation for most of the aggregated figures. The rate of estimation for total scientists and engineers in 1975, for example, comprised only 9 percent of the universe total. Note that rates of imputation refer only to the portion of the total estimated by NSF and, therefore, do not take into account estimates by the institutions.

- To reduce tedious repetition, the term "S/E" is used frequently as an abbreviation for "science and engineering."

- Detailed notes on the scope of the survey and limitations of the data are included in the technical notes, appendix A.

acknowledgments

This report was prepared in the Universities and Nonprofit Institutions Studies Group by Robert J. Loycano, Assistant Study Director, with the assistance of J. G. Huckenpahler, Esther Gist, Richard Bennof, and Lynne Versel. Richard M. Berry, Study Director, and Penny Foster, Associate Study Director, supervised the preparation of the report, and William L. Stewart, Head of the R&D Economic Studies Section, provided guidance and review.

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[1] See note on p. 29

HIGHLIGHTS

• In January 1975 the total number of scientists and engineers employed at universities and colleges was 297,200, up nearly 4 percent over 1974. Universities and colleges account for approximately 1 out of every 8 scientists and engineers employed in the United States.

• Scientists and engineers employed at universities and colleges increased in each of six consecutive surveys conducted over the last decade.

• In 1975 employment of full-time academic scientists and engineers rose nearly 3 percent over the 1974 level to a new high of 239,200. Employment of part-time academic scientists and engineers jumped 10 percent to 58,100, also a new high.

• The relative level of R&D activities at universities and colleges declined during the 1965-71 period and remained stable from 1971-75. In terms of full-time equivalents, for example, the percentage of scientists and engineers engaged in R&D activities dropped from 26 percent to 20 percent between 1965 and 1971 and remained near that level from 1971-75.

• As the relative level of research and development declined, the increasing emphasis on teaching was a response both to the shifting priorities at academic institutions and to the 63-percent increase in total (opening fall) enrollment during the 1964-70 period.

• From 1974 to 1975 the number of full-time scientists and engineers engaged primarily in R&D activities, however, increased 4 percent to 49,600. Virtually all of the increase was accounted for by medical and biological scientists.

• During the last decade, psychologists, mathematicians, and social scientists showed the largest relative growth among the major fields of employment. Together these three categories accounted for an increase of 105 percent. In 1965 they made up 31 percent of all scientists and engineers; by 1975 their proportion of the total increased to 39 percent.

• Doctorate-granting institutions, representing 13 percent of the number of institutions surveyed, employed 63 percent of the scientists and engineers at all academic institutions, 75 percent of all doctoral scientists and engineers, and 98 percent of all R&D scientists and engineers.

• The position of private academic institutions in terms of S/E employment continued to weaken in 1975. They registered an overall 1-percent decline in full-time scientists and engineers to a level of 71,500. Public institutions, on the other hand, reported an increase of 4 percent to a new high of 167,700. The proportion of scientists and engineers employed by private institutions has declined steadily for at least the last 6 years, from 36 percent of the total in 1969 to 30 percent in 1975. This drop parallels a similar decline in the private institutions' share of total enrollment over a comparable 6-year period, from 28 percent in fall 1968 to 22 percent in fall 1974.

• Women showed larger percentage increases in employment than men in all major fields except the environmental sciences, where employment of women increased 6 percent compared to 2 percent for men. Despite the higher employment growth rate for women, their proportion of total full-time scientists and engineers, 15 percent, increased less than 1-percentage point during 1974-75.

• Graduate students employed as scientists and engineers at academic institutions increased by 3 percent, to 99,300, from 1974-75. The largest number of graduate students was employed in the life sciences—26,800, or 27 percent of the total.

• The 57,100 S/E technicians employed at universities and colleges in 1975 represented a 6-percent increase over the 1974 total. Technician employment was dominated by life science occupations. Medical and health-related fields, together with the biological sciences, accounted for nearly three-fifths of all technicians employed in 1975.

• Federally Funded Research and Development Centers (FFRDC's) administered by universities and colleges employed 12,500 scientists and engineers in 1975, up 5 percent over the 1974 total. Four-fifths of all scientists and engineers at FFRDC's were employed in either engineering or the physical sciences.

INTRODUCTION

This report presents the results of the National Science Foundation's Survey of Scientific and Engineering Personnel Employed at Universities and Colleges, January 1975. The survey deals exclusively with the employment of professional and technical personnel in the sciences and engineering and complements a separately conducted survey on expenditures in the sciences and engineering at U.S. academic institutions. Compatible time series data at aggregate levels are available from 1965-75.

This document represents the first NSF report within the last 10 years with sole emphasis on employment levels of professional and technical personnel in the sciences and engineering at universities and colleges. Previously, such information was presented in combination with scientific and engineering expenditures at universities and colleges, but because of different time frames for the two sets of data, they are now handled as separate surveys. The latest report in the expenditure survey series was released recently and is entitled *Expenditures for Scientific and Engineering Activities at Universities and Colleges, Fiscal Year 1974* (NSF 76-303).

The NSF manpower survey was conducted on a biennial basis until 1973. Because of the National Science Board's increasing interest in information about the utilization of science resources, and because of the increased need for information by the Director of NSF by virtue of his assignment as the Government's principal advisor in science and technology matters, the survey has been conducted on an annual basis since 1973.

The survey obtained employment figures for scientists and engineers, graduate students receiving stipends for part-time S/E services, and S/E technicians as of January 1975.

Data presented for universities and colleges in part I do not include data for associated Federally Funded Research and Development Centers (FFRDC's). Independent returns were received from 21 FFRDC's and are analyzed in part II.

Details regarding the scope, coverage, methods of estimating, and limitations of the survey are presented in the technical notes in appendix A. Detailed statistical tables on universities and colleges were released separately in November 1975 as appendix B (NSF 75-329). A summary questionnaire for all academic institutions is repeated for reference in appendix B, along with selected other tabulations and a summary questionnaire for the 21 university-associated FFRDC's. Sample survey materials, including the questionnaire and instructions, are included in appendix C.

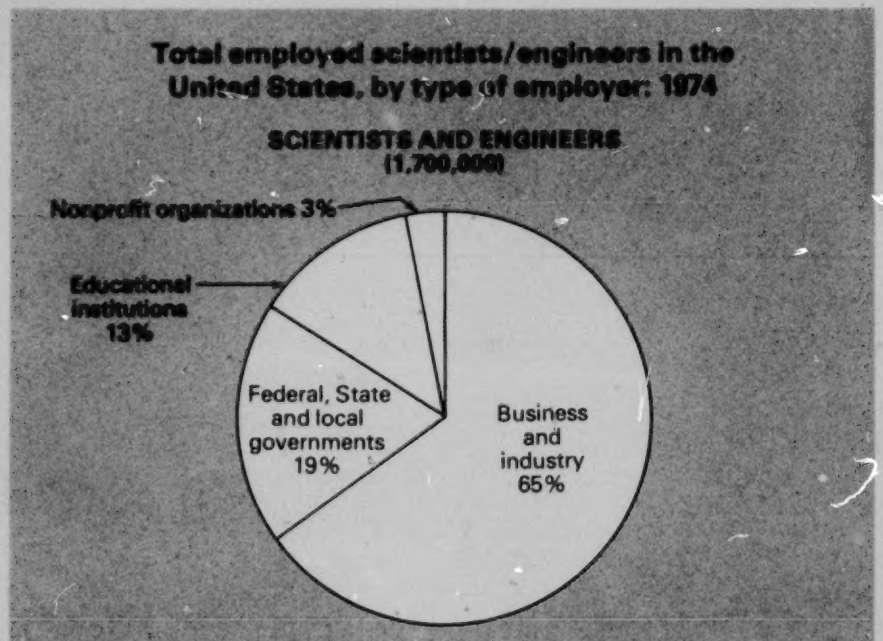
Part I
UNIVERSITIES AND COLLEGES

Section 1. EMPLOYMENT OF SCIENTISTS AND ENGINEERS

This section focuses principally on employment of full-time and part-time scientists and engineers at universities and colleges. For the purpose of this study, scientists and engineers include compensated faculty members, postdoctorals, and other professional staff engaged in teaching, research and development, and other science activities in any of 23 specific S/E categories.[1] Graduate students, employed part time as scientists and engineers, and technicians are treated separately in sections 2 and 3, respectively, of part I.

National Perspective

The Nation's universities and colleges not only play an indispensable role as a source of current and future scientists and engineers but also account for a sizable share of all those employed in the United States. In 1974, for example, approximately one out of every eight in the United States was employed in an academic institution. Nearly five out of eight were employed in industry, less than two out of eight were working in various levels of government, and a small number were employed in other nonprofit institutions.


Total employed scientists/engineers in the United States, by type of employer: 1974
SCIENTISTS AND ENGINEERS (1,700,000)
Nonprofit organizations 3%
Educational institutions 13%
Federal, State and local governments 19%
Business and industry 65%
SOURCE: National Science Foundation.

Trends

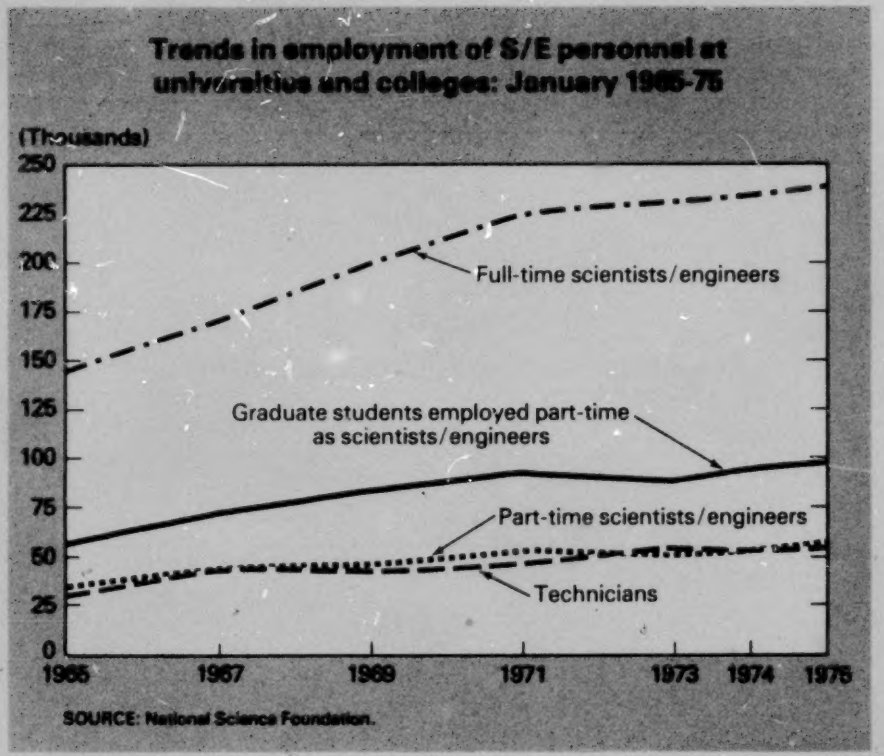
The number of scientists and engineers employed at universities and colleges increased in six consecutive surveys conducted between 1965 and 1975. The full-time number expanded from 142,700 to 239,200, while those employed part time grew from 36,200 to 58,000.

The rate of growth, however, has slowed considerably over this period. Full-time scientists and engineers, for example, rose at an average rate of 7.7 percent from 1965-71, fell to 1.5 percent from 1971-74, and increased slightly to 2.5 percent from 1974-75.

Employment of part-time scientists and engineers and graduate students showed a growth pattern consistent with those employed full time. Part-time scientists and engineers increased at an annual rate of 5.8 percent from 1965-71, fell to an annual 1.4-percent increase from 1971-74, and accelerated to a 9.8-percent rise from 1974-75. For these same three time intervals corresponding annual growth rates for graduate students receiving compensation for part-time S/E services were 8.3 percent, 0.7 percent, and 3.2 percent, respectively.

Employment of technicians, on the other hand, showed a more stable pattern of annual growth—6.1 percent from 1965-71, 5.4 percent from 1971-74, and 5.8 percent from 1974-75.

[1] See appendix C for fields covered, definitions, and complete survey instructions, including information on specific types of data to be reported or excluded from the survey.

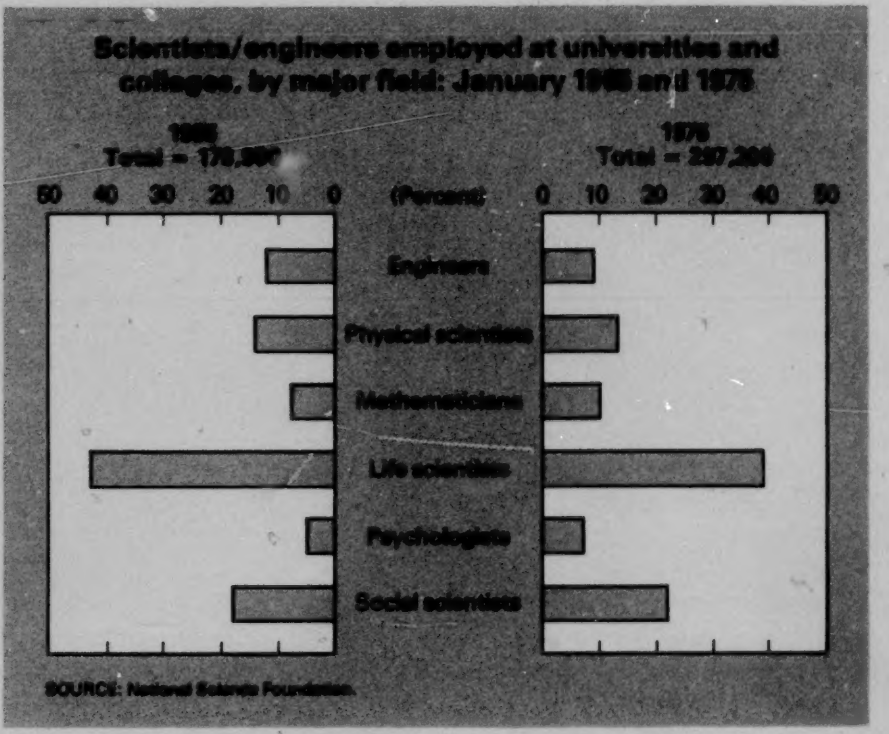


The 10-percent increase in the number of part-time scientists and engineers, to some extent, reflects a recent shift in employment policy at several leading institutions toward the hiring of a greater proportion of part-time personnel. One of the principal reasons for such a shift is that institutions have greater flexibility in increasing or reducing the number of part-time personnel during periods of expansion or contraction.

Trends in the employment of academic scientists and engineers over the last decade reflect many of the factors influencing general supply and demand of university faculty. In the earlier part of the decade, for example, college enrollment, higher education, income, and academic employment increased rapidly. In the latter part of the period, declining growth rates in enrollment and income, along with increasing inflation and expenditures, led to tight fiscal conditions and moderation in the growth of academic employment.

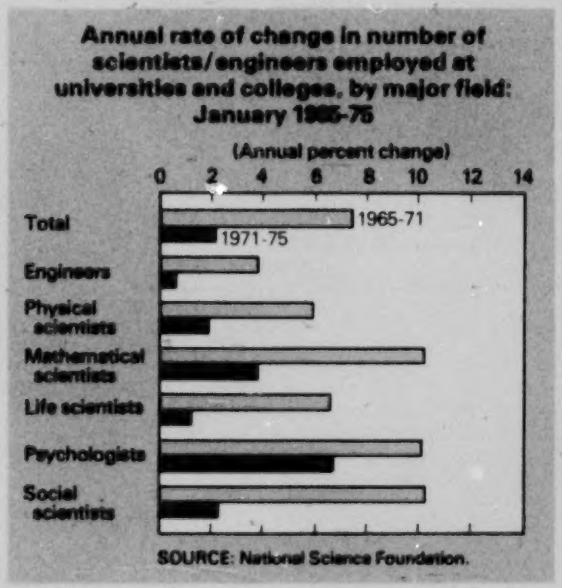
Field of Employment

During the last decade, psychologists, mathematicians, and social scientists showed the largest relative growth among the major fields of employment. Over this period these three employment categories increased by 130 percent, 108 percent, and 97 percent, respectively. In 1965 these categories made up 31 percent of all scientists and engineers. By 1975 their proportion of the S/E total increased to 39 percent. By contrast, the number of engineers grew by only 28 percent over the last 10 years and their share of the total scientists and engineers decreased from 12 percent to 9 percent. The number of full-time engineers, moreover, is at the lowest level since 1969.



Life and physical scientists exhibited moderate growth in employment levels over the 10-year period, as exhibited in the accompanying chart showing average annual growth for major fields. Average annual growth in the life sciences declined from 6.5 percent, during 1965-71, to 1.3 percent from 1971-75. Annual growth rates for the physical sciences also showed a decline between these two periods: from 5.9 percent to 1.9 percent. More than five-sixths of the 10-year increases in these fields occurred during the 1965-71 period.

A number of recent significant changes occurred in employment levels in several detailed fields. Over the 1971-75 period, for example, employment changes ranged between a 25-percent decline for aeronautical and astronautical engineering to a 29-percent increase in psychology. Other fields showing substantial increases since 1971 were sociology, up 25 percent; earth sciences (including atmospheric sciences and oceanography), up 20 percent; and biological sciences, up 20 percent.



Nearly two-fifths of all academic scientists and engineers employed in 1975 were concentrated in the life sciences. Employment of medical scientists amounted to 62,900, or 21 percent of total scientists and engineers; by far, the largest share of any field. Biological scientists accounted for the second largest share with 38,000, or 13 percent of the total. Agricultural scientists, the remaining life science employment category, numbered 15,000, or 5 percent. While the proportions of medical and biological scientists remained relatively stable or showed strength in recent years, the percentage of agricultural scientists has declined by one-third since 1965. The 1975 agricultural scientist total, although up from 1974, remains lower than any previous year since 1967 (table 1).

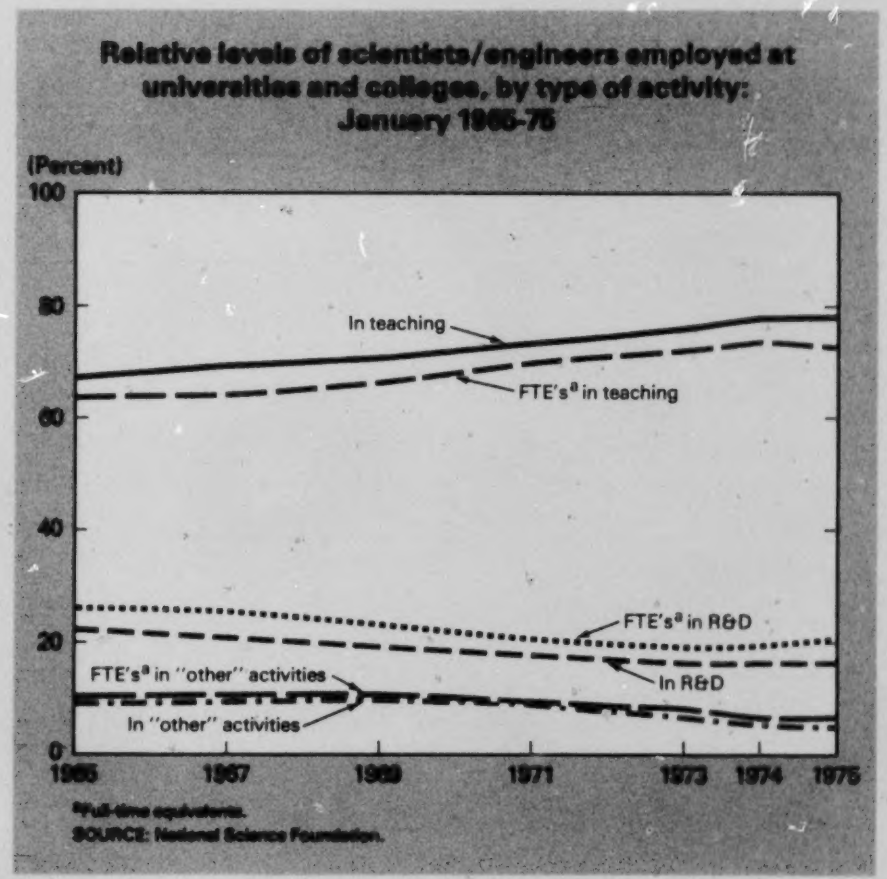
Table 1.—Number of scientists and engineers employed at universities and colleges, by field of employment: January 1965-75

Field of employment	January						
	1965	1967	1969	1971	1973	1974	1975
Total	178,904	212,855	246,183	273,775	281,516	286,098	297,193
Engineers	21,681	25,253	25,387	27,130	27,530	27,148	27,662
Aeronautical engineers	1,127	1,360	1,357	1,469	1,480	1,191	1,099
Chemical engineers	1,571	1,565	1,735	1,843	1,761	1,724	1,842
Civil engineers	3,145	3,660	3,894	4,129	4,487	4,545	4,798
Electrical engineers	5,478	6,563	6,803	6,885	6,941	6,475	6,701
Mechanical engineers	4,108	4,638	4,812	5,387	5,188	4,959	5,258
Other engineers	6,252	7,467	6,786	7,417	7,673	8,254	7,964
Physical scientists	25,485	31,354	33,698	35,943	37,154	38,165	38,781
Chemists	10,684	12,961	14,201	14,688	15,289	16,069	16,253
Earth scientists[1]	4,005	5,111	5,549	6,500	6,935	7,569	7,817
Physicists	9,132	11,127	11,766	12,195	12,185	12,138	12,311
Other physical scientists	1,664	2,155	2,182	2,560	2,745	2,389	2,400
Mathematical scientists	13,680	17,776	22,495	24,548	24,772	27,108	28,445
Life scientists	75,775	87,347	97,206	11,0274	112,670	112,268	115,924
Agricultural scientists	13,507	14,950	15,150	18,039	15,278	14,269	14,969
Biological scientists	24,281	27,419	29,257	31,808	33,632	35,730	38,020
Medical scientists	37,987	44,978	52,799	60,427	63,760	62,269	62,935
Psychologists	9,430	11,358	14,780	16,806	18,881	19,966	21,727
Social scientists	32,853	39,767	52,617	59,074	60,509	61,443	64,654
Economists	7,932	9,662	10,402	11,263	11,378	12,041	12,713
Sociologists	6,261	7,558	9,451	11,323	12,485	13,011	14,203
Political scientists	5,919	7,190	7,919	8,938	9,705	10,010	10,605
Historians	NA	NA	14,427	15,871	16,289	15,896	15,758
Other social scientists	12,741	15,357	10,418	11,679	10,652	10,485	11,375

[1] Includes data for atmospheric scientists and oceanographers.
NA-not available
Source: National Science Foundation

Type of Activity

During the 1965-75 period relative levels of academic S/E activities have shown a trend away from R&D programs toward more teaching activities. The relative decline in R&D activities has occurred both in terms of the number of scientists and engineers primarily engaged in research and development and the total research effort as measured by full-time equivalents (FTE).



The major portion of the decline occurred in the 1965-71 period when the relative number of R&D scientists and engineers fell from 22 percent to 18 percent of the total. The FTE level showed a parallel drop, from 26 percent in 1965 to 20 percent in 1971.

The increased emphasis on teaching is a reflection, no doubt, of the slowdown in research growth over this period and the need to meet the increased teaching demands, particularly over the 1964-70 period when total enrollment at academic institutions increased by 63 percent.

Of 239,200 full-time scientists and engineers employed at academic institutions in 1975, 181,500, or 76 percent, were reported as primarily engaged in teaching activities, compared to 43,200, or 18 percent, in R&D functions, and 14,500, or 6 percent, in other activities (table 2).

In the life sciences, 56,400, or 31 percent, full-time scientists and engineers were reported under teaching. Of this total, more than one-half were medical scientists and two-fifths were biological scientists.

Overall, full-time scientists and engineers primarily engaged in teaching increased by 2 percent from 1974-75. Although the increase was small, it was widespread with 20 of 23 categories showing higher employment totals in 1975 than in 1974.

There was less than a 1-percent increase in the number of full-time scientists and engineers reported under "other activities." More than two-thirds of those in this category consisted of agricultural scientists (agricultural extension personnel) and medical scientists.

In 1975, as in previous years, the largest number of R&D full-time scientists and engineers were employed in the life sciences: medical sciences—12,900; biological sciences—9,500; and agricultural sciences—4,000. Together these fields accounted for more than three-fifths of the R&D full-time total.

Virtually all of the 4-percent increase in the total full-time R&D scientists and engineers from 1974-75 was accounted for by medical and biological employment, which went up by 9 percent and 10 percent, respectively.

Of the 23 fields used in the survey, 10 showed declines in total numbers of R&D full-time scientists and engineers from 1974-75. Nine of the 10 decreases occurred in engineering and the physical and environmental sciences. The largest of the reductions was reported for aeronautical and astronautical engineers, down 18 percent.

Table 2.—Number of full-time scientists and engineers employed at universities and colleges, by field of employment and function: January 1974-75

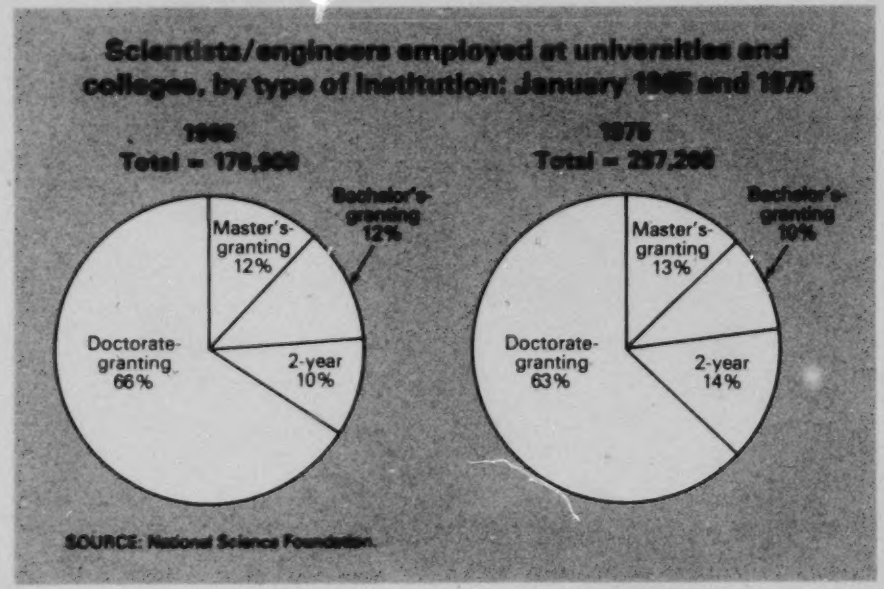
Field of employment	Total		Function					
	1975	1974	Teaching		Research & Development		Other activities	
			1975	1974	1975	1974	1975	1974
Total	239,212	233,270	181,524	177,457	43,199	41,410	14,489	14,403
Engineers	22,478	22,765	17,543	17,650	4,047	4,168	888	947
Aeronautical & astronautical engineers	947	1,023	691	711	246	301	10	11
Chemical engineers	1,590	1,522	1,268	1,216	267	263	55	43
Civil Engineers	3,794	3,760	3,243	3,196	434	434	117	130
Electrical engineers	5,367	5,404	4,295	4,293	910	942	162	169
Mechanical engineers	4,328	4,255	3,681	3,609	530	509	117	137
Other engineers	6,452	6,801	4,365	4,625	1,660	1,719	427	457
Physical scientists	26,833	26,857	20,860	20,762	5,507	5,629	466	466
Chemists	13,943	14,080	11,208	11,195	2,472	2,613	263	272
Physicists	10,953	10,873	8,589	8,459	2,215	2,266	149	148
Other physical scientists	1,937	1,904	1,063	1,108	820	750	54	46
Environmental scientists	6,782	6,505	4,988	4,724	1,649	1,642	145	139
Earth scientists	5,168	4,958	4,254	4,029	805	836	109	93
Atmospheric scientists	564	571	323	302	222	253	19	16
Oceanographers	1,050	976	411	393	622	553	17	30
Mathematical scientists	22,524	22,168	20,406	20,043	1,368	1,325	750	800
Mathematicians (excluding computer scientists)	18,747	18,498	17,806	17,599	719	698	222	201
Computer scientists (excluding programmers)	3,777	3,670	2,600	2,444	649	627	528	599
Life scientists	92,419	89,559	56,388	55,087	26,347	24,471	9,684	10,001
Agricultural scientists	13,970	13,431	3,873	3,630	3,989	4,067	6,108	5,734
Biological scientists	33,291	31,546	23,000	22,138	9,470	8,571	821	837
Medical scientists	45,158	44,582	29,515	29,319	12,888	11,833	2,755	3,430
Psychologists	16,125	14,960	13,783	13,024	1,131	1,105	1,211	831
Social scientists	52,051	50,456	47,556	46,167	3,150	3,070	1,345	1,219
Economists	10,230	9,831	8,688	8,425	1,104	1,019	438	387
Sociologists	10,777	10,052	9,975	9,379	588	491	214	182
Political scientists	8,741	8,402	8,207	7,855	372	403	162	144
Historians	13,572	13,791	13,182	13,288	236	368	154	135
Other social scientists	8,731	8,380	7,504	7,220	850	789	377	371

Source: National Science Foundation

Type of Institution

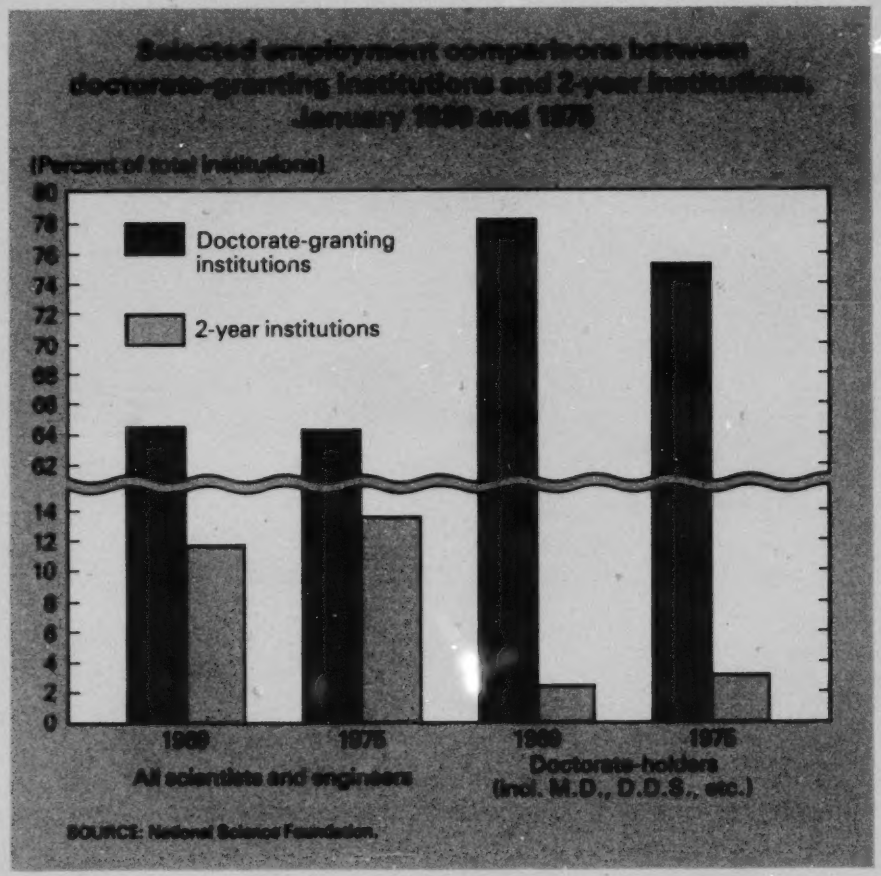
The 293 doctorate-granting institutions in the 1975 survey, representing only 13 percent of the total number of academic institutions surveyed, accounted for 38 percent of both total R&D scientists and engineers employed at all universities and colleges in 1975 and total academic R&D expenditures in fiscal year 1974. Moreover, doctorate-granting institutions employed 63 percent of all scientists and engineers, including those primarily engaged in teaching and other science activities.

In terms of total employment of scientists and engineers, however, there has been a slight shift from doctorate-granting institutions toward 2-year institutions. Between 1965 and 1975, for example, the proportion of those employed at 2-year institutions increased from 10 percent to 14 percent, while the percentage employed at doctorate-granting institutions declined from 66 percent to 63 percent. This is attributable to a growth rate at 2-year institutions that was approximately double that at doctorate-granting institutions throughout the 1965-75 period.

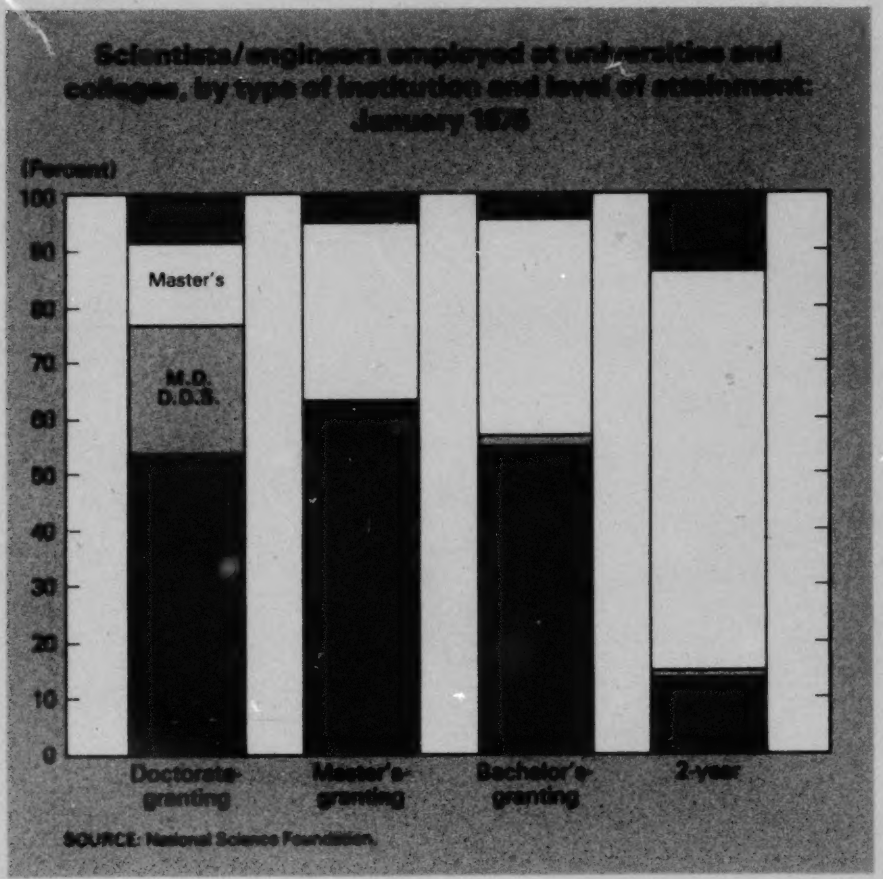


Holders of Doctorate Degrees

While doctorate-granting institutions accounted for the predominant share of personnel employed, 2-year institutions represented the largest share (36 percent) of institutions surveyed. Two-year institutions accounted for relatively small shares of total scientists and engineers and total doctorates employed in 1975—14 percent and 3 percent, respectively. Although the proportion of doctorates remains small at 2-year institutions, there has been an increase in this proportion between 1969 and 1975. This increase is primarily due to the fact that the annual rate of growth of doctorates at 2-year institutions over the 1969-75 period was 9 percent, compared to 4 percent at doctorate-granting institutions.

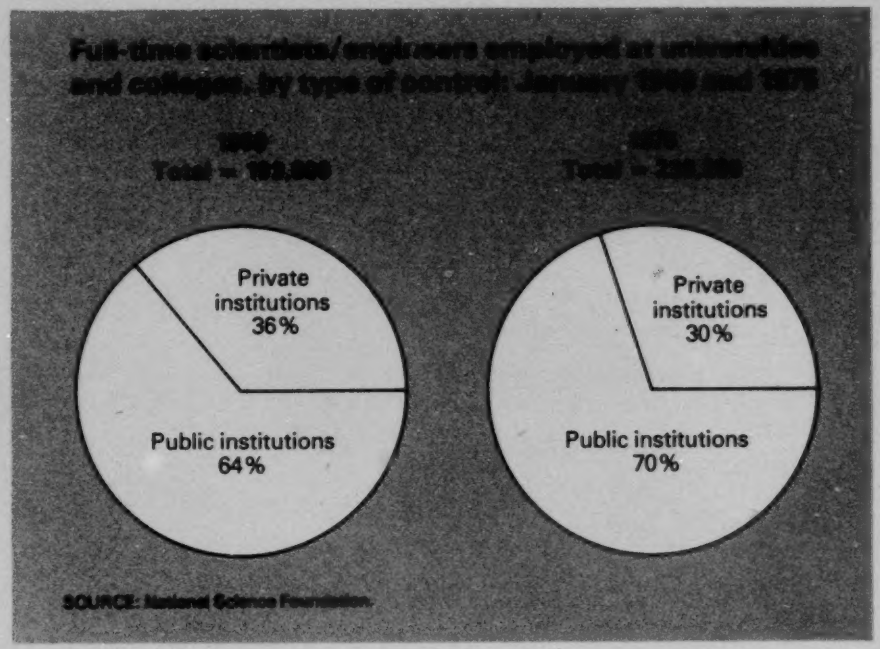


The increase in employment of scientists and engineers holding Ph.D. degrees at all institutions kept pace with overall increases in academic employment in these fields from 1974-75. Full-time scientists and engineers holding Ph.D. degrees increased by 4 percent while Ph.D.'s working part time rose by 10 percent. Ph.D. holders now account for 55 percent of all full-time scientists and engineers compared to 47 percent in 1969. By level of institution, the proportion of Ph.D.'s in 1975 ranged from 13 percent of the 2-year S/E total to 59 percent of the doctorate-granting S/E total.



Type of Control

The position of private academic institutions in employment of scientists and engineers continued to weaken in 1975 relative to public institutions. From 1974-75 employment of these personnel at private universities and colleges declined slightly to a level of 71,500. Public institutions, on the other hand, reported a 4-percent increase in full-time employment to a new high of 167,700. The proportion of scientists and engineers accounted for by private institutions declined steadily from 36 percent in 1969 to 30 percent in 1975. This represents a relative drop of more than one-sixth in the private sector's share of academic S/E employment. This reduction in the employment level parallels a similar decline in the private institutions' share of total enrollment over a comparable 6-year period, from 28 percent in fall 1968 to 22 percent in fall 1974.



Further indications of the weakening position of private institutions are the following: (1) since 1972, 56 private colleges have closed and another 22 have merged or changed to public control;[2] (2) from 1973-75 salaries of full-time faculty rose almost twice as fast at public institutions as at private institutions.[3]

Public institutions also reported greater increases in part-time employment of scientists and engineers than private institutions (table 3). In the last year, for example, part-time employment at public institutions rose by 14 percent, more than three times the relative increase registered by private institutions, although part-time scientists and engineers continue to comprise a higher share of total employment of scientists and engineers at private institutions than at public institutions—24 percent versus 17 percent.

[2] "Private Colleges: the Toll Since 1972," *The Chronicle of Higher Education*, XI (September 22, 1975), p. 4. (Based on data collected by the National Council of Independent Colleges and Universities.)

[3] Magarrell, Jack, "Who Earns How Much in Academe," *The Chronicle of Higher Education*, IX (February 10, 1975), p. 1. (Based on data collected by the National Center for Education Statistics.)

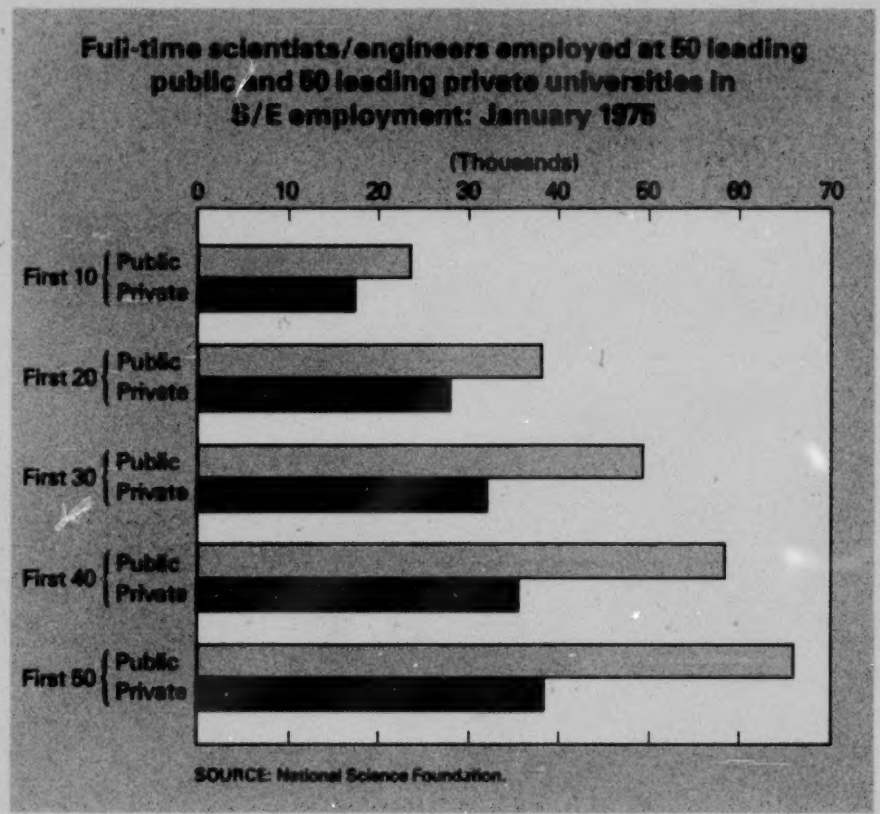
Table 3.—Employment of part-time scientists and engineers at universities and colleges as a percent of total scientists and engineers, by type of control: January 1974-75

Type of control	1974			1975			Percent change, 1974-75
	Part-time	Total	Part-time as percent of total	Part-time	Total	Part-time as percent of total	
Total	52,828	286,098	18.5	57,981	297,193	19.5	9.8
Public institutions	31,175	191,855	16.2	35,431	203,135	17.4	13.7
Private institutions	21,653	94,243	23.0	22,550	94,058	24.0	4.1

Source: National Science Foundation

The difference in S/E employment levels between public and private institutions is evident at both graduate levels as well as at the 2-year level. Combined, these three levels show public institutions representing 64 percent of total scientists and engineers, compared to 24 percent for private institutions. At the bachelor's level, however, private institutions, with 7 percent of the total, continue to employ more scientists and engineers than public institutions with 4 percent.

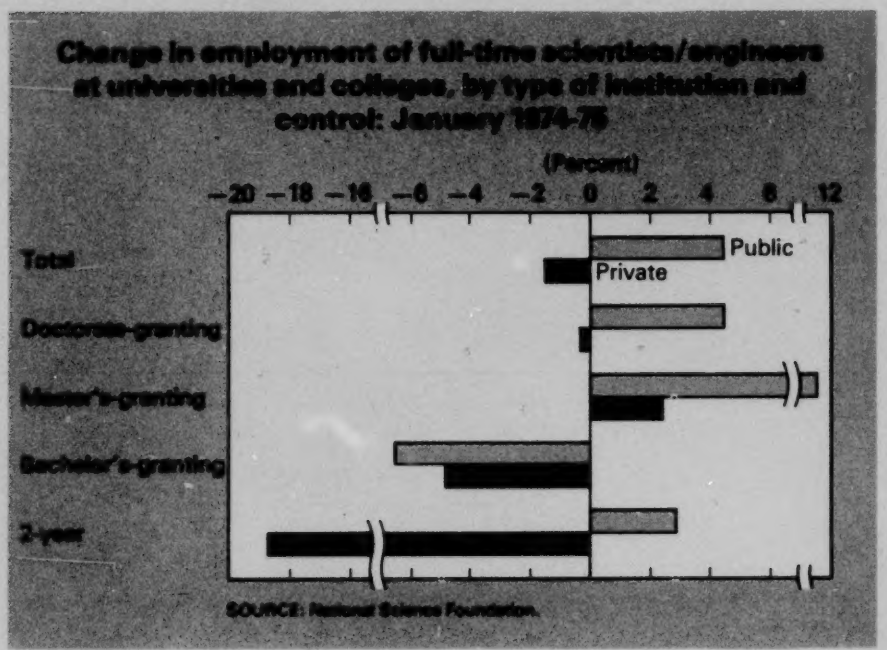
Primarily because of larger average student enrollment, the largest public universities employ considerably more scientists and engineers than private institutions. For example, in 1975 the 50 leading public universities employed 65,800 full-time scientists and engineers—72 percent more than the 38,200 employed at 50 leading private institutions. Moreover, of 43 universities employing more than 1,000 of these full-timers, 29 were public and 14 were



private. Employment was far more concentrated, however, in private institutions. The first 10 private universities accounted for 24 percent of full-time scientists and engineers employed by all private institutions, compared to only 14 percent for the first 10 public universities.

There are some notable differences in the 1974-75 rates of change in employment between public and private institutions at both the graduate level and at the 2-year level. Public graduate institutions accounted for nearly all of the 1974-75 increase in employment of full-time scientists and engineers. Public doctorate-granting institutions showed a 4-percent rise and public master's-granting institutions reported an 11-percent increase in full-timers. Private doctorate-granting institutions, on the other hand, exhibited a slight decline (less than 1 percent), and private master's-granting institutions showed a 2-percent increase in these full-timers.

Full-time employment of scientists and engineers at public 2-year institutions rose by 3 percent, compared to a 19-percent decline at private 2-year institutions. Private doctorate-granting institutions accounted for 21 percent of total academic S/E employment in 1975. This proportion has slipped 2 percentage points over the last 2 years. Bachelor's-granting and 2-year institutions showed lesser declines in their shares of total S/E employment.



Geographic Distribution

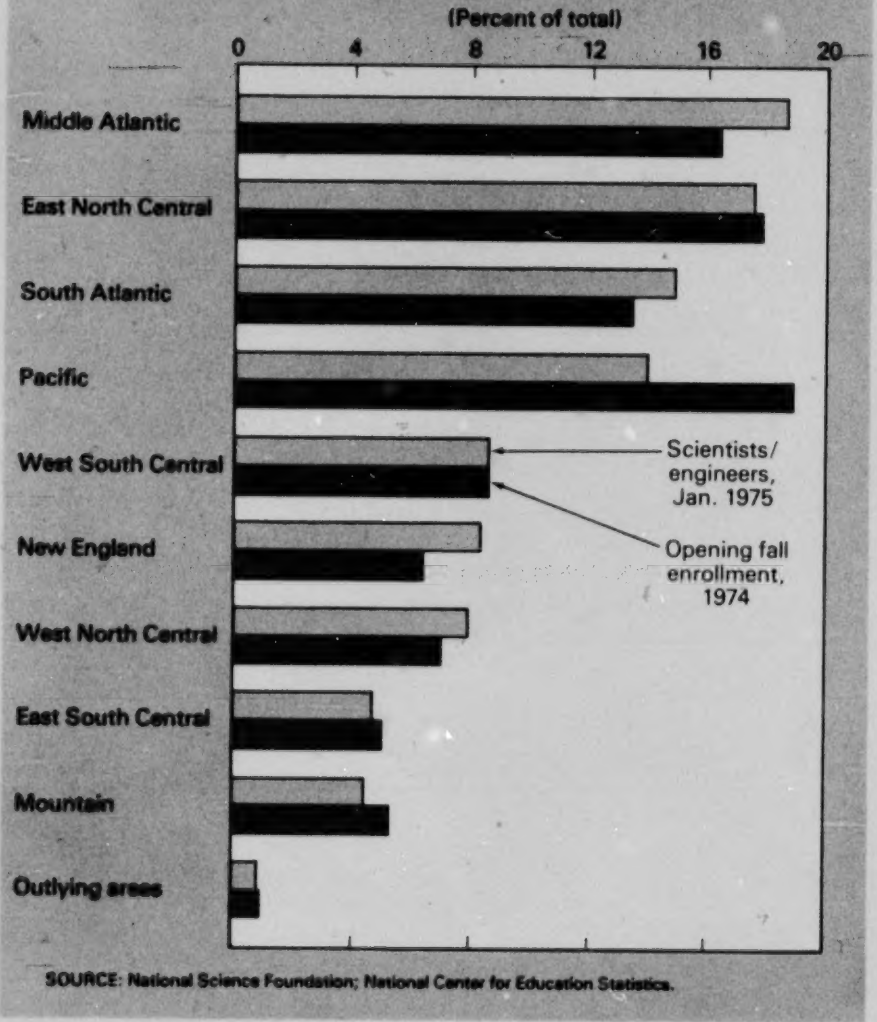
Universities and colleges in the Middle Atlantic and East North Central divisions together accounted for 36 percent of total S/E employment in 1975. At the other end of the employment scale were the Mountain and East South Central divisions with a combined share amounting to 9 percent of the U.S. total. These figures compare well with the previous opening fall enrollment in these divisions: 34 percent and 10 percent, respectively.

Institutions in the South Atlantic and West South Central regions showed the highest growth rates from 1971 to 1975; 17 percent and 22 percent, respectively. With the exceptions of the Middle Atlantic and the West North Central States, each of the other divisions witnessed growth rates of 7 percent to 12 percent in the 1971-75 period.

There is a close relationship between the geographic distributions of S/E employment, R&D expenditures, and opening fall enrollment. The leading 10 States in employment of scientists and engineers, for example, accounted for 56 percent of all U.S. academic scientists and engineers, 58 percent of R&D expenditures, and 56 percent of total enrollment.

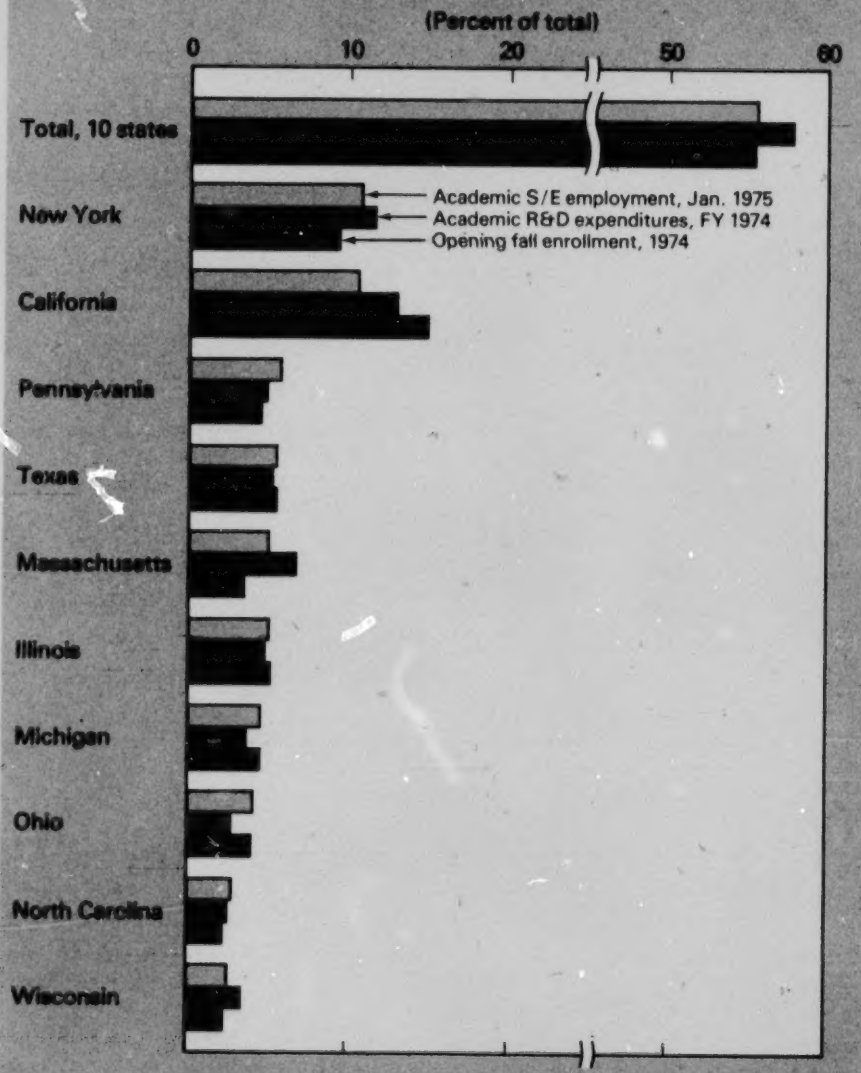
New York, the leading State in employment, reported 11 percent of academic scientists and engineers, 11 percent of R&D expenditures, and 9 percent of total enrollment. Texas and Illinois, the fourth and sixth leading States in academic employment of scientists and engineers, showed 5 percent in each of the three categories. The biggest difference occurred in California, which accounted for 10 percent of these personnel, but 13 percent of R&D expenditures and 15 percent of total enrollment.

Scientists/engineers employed at universities and colleges, compared to total enrollment, by geographic division



SOURCE: National Science Foundation; National Center for Education Statistics.

Scientists/engineers employed at universities and colleges in 10 States leading in employment of scientists/engineers, compared to R&D expenditures and enrollment

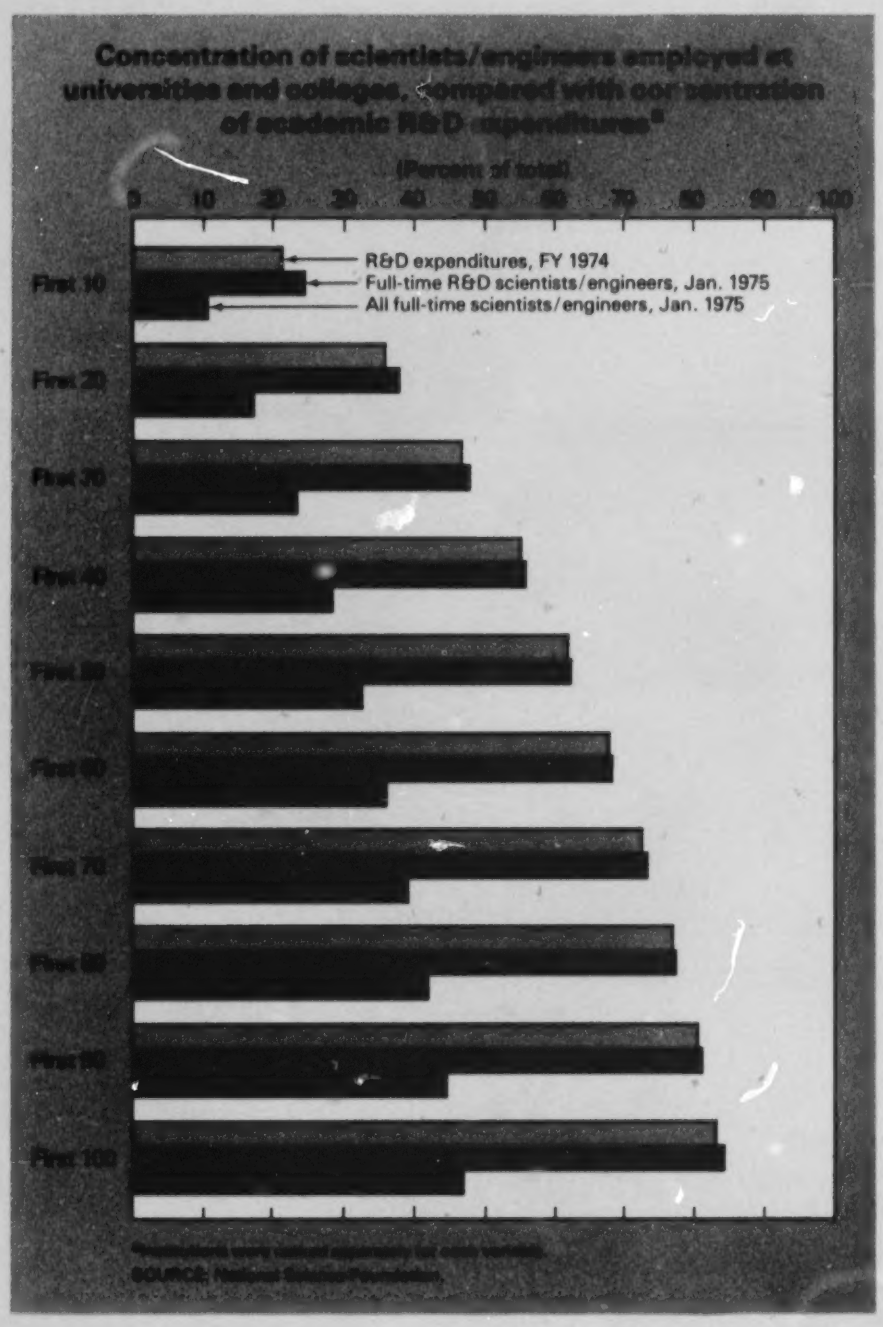


SOURCE: National Science Foundation; National Center for Educational Statistics.

Institutional Distribution

Among leading groups of institutions, employment of full-time R&D scientists and engineers shows about the same level of concentration as R&D expenditures. For example, the first 20 institutions in R&D full-time employment represented 38 percent of all R&D full-timers, while the first 20 in R&D expenditures accounted for 36 percent of the expenditure total. Similarly, the first 100 in R&D full-time employment accounted for 84 percent of all R&D full-timers and the first 100 in R&D expenditures represented 83 percent of R&D expenditures by all institutions.

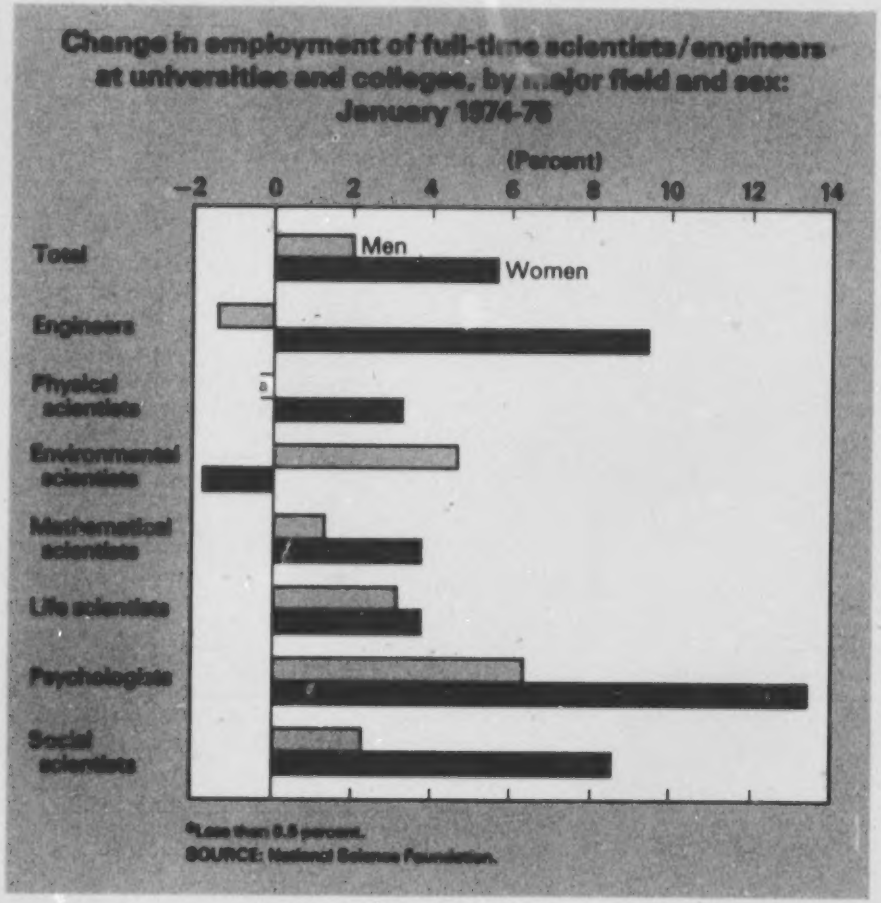
All full-time scientists and engineers—76 percent of which were primarily engaged in teaching in January 1975—showed a much lower level of concentration. Since some 2,200 institutions are involved in S/E teaching activities, compared to approximately 550 institutions engaged in R&D projects, the distribution of scientists and engineers engaged primarily in teaching is considerably more widespread. The level of concentration for all full-time scientists and engineers (including those in teaching or research and development) is little more than one-half that of R&D scientists and engineers or R&D expenditures. The first 100 institutions in employment of full-time scientists and engineers, for example, accounted for 47 percent of full-timers employed at all institutions, while the first 100 universities in R&D full-time scientists and engineers employed 84 percent of total R&D scientists and engineers.



Sex Distribution

From 1974 to 1975 women showed larger gains in employment than men in all major fields except in the environmental sciences.[4] Overall, women registered a 6-percent gain in employment, compared to a 2-percent rise for men. Higher percentage gains for women were reflected at both public and private institutions. Despite the higher employment growth for women, their proportion of total full-time scientists and engineers, 15 percent, increased less than 1-percentage point from 1974-75.

[4] The first year that the survey collected data by sex was 1974.



The proportion of women varied from less than 1 percent of all full-time mechanical engineers to more than 24 percent of all full-time sociologists in 1975. Another occupational category with a relatively high representation of women was "medical scientists," where 23 percent were reported.

More than one-half of women scientists and engineers were working in the life sciences (table 4). At the detailed field level the proportions ranged from 0.1 percent in the atmospheric sciences as well as in each of the aeronautical, chemical, and mechanical engineering categories, to 29 percent in the medical sciences.

Men were also concentrated most heavily in the life sciences but not to the same degree as women: the life sciences accounted for somewhat more than one-third of all male full-time scientists and engineers. Among detailed occupational categories, aeronautical engineering and oceanography claimed the smallest proportions of men at 0.5 percent each, while the medical sciences included the largest percentage of men at 17 percent.

The distribution of men and women among the fields of science and engineering show significant differences in nearly all categories.

No sudden dramatic shift in the distribution of women by field should be expected in the near future, according to a recent study by Dr. Joseph L. McCarthy and Dr. Dael Wolfle concerning doctorates from 46 leading institutions comprising the Association of American Universities, as quoted below:

> In general women constitute prominent percentages in those fields in which traditionally they have held significant numbers of doctorates, and they remain few in those fields in which traditionally that has been the case. In percentage terms the trend is upward in nearly all fields, but in some it will be difficult to increase the number of women faculty members rapidly because the absolute number of degrees awarded are so small. In 1969-72, 47 percent of all the women's doctorates were concentrated in only 6 fields: anthropology, biology, education, health sciences, psychology, and Romance languages. For 1972-75, 45 percent are still in these 6 fields.[5]

[5] Joseph L. McCarthy and Dael Wolfle, "Doctorates Granted to Women and Minority Group Members," *Science* (Sept. 12, 1975), p. 857.

Table 4.—Number of full-time scientists and engineers employed at universities and colleges, by field of employment and sex: January 1975

Field of employment	Total	Men			Women		
		Number	Percent distribution	Percent of total	Number	Percent distribution	Percent of total
Total	239,212	202,562	100.0	84.7	36,650	100.0	15.3
Engineers	22,478	22,107	10.9	98.3	371	1.0	1.7
Aeronautical and astronautical engineers	947	922	.5	97.4	25	.1	2.6
Chemical engineers	1,590	1,566	.8	98.5	24	.1	1.5
Civil engineers	3,794	3,731	1.8	98.3	63	.2	1.7
Electrical engineers	5,367	5,310	2.6	98.9	57	.2	1.1
Mechanical engineers	4,328	4,298	2.1	99.3	30	.1	.7
Other engineers	6,452	6,280	3.1	97.3	172	.5	2.7
Physical scientists	26,833	24,830	12.3	92.5	2,003	5.5	7.5
Chemists	13,943	12,509	6.2	89.7	1,434	3.9	10.3
Physicists	10,953	10,569	5.2	96.5	384	1.0	3.5
Other physical scientists	1,937	1,752	.9	90.4	185	.5	9.6
Environmental scientists	6,782	6,462	3.2	95.3	320	.9	4.7
Earth scientists	5,168	4,944	2.4	95.7	224	.6	4.3
Atmospheric scientists	564	530	.3	94.0	34	.1	6.0
Oceanographers	1,050	988	.5	94.1	62	.2	5.9
Mathematical scientists	22,524	19,596	9.7	87.0	2,928	8.0	13.0
Mathematicians (excluding computer scientists)	18,747	16,275	8.0	86.8	2,472	6.7	13.2
Computer scientists (excluding programmers)	3,777	3,321	1.6	87.9	456	1.2	12.1
Life scientists	92,419	73,155	36.1	79.2	19,264	52.6	20.8
Agricultural scientists	13,970	11,656	5.8	83.4	2,314	6.3	16.6
Biological scientists	33,291	26,933	13.3	80.9	6,358	17.3	19.1
Medical scientists	45,158	34,566	17.1	76.5	10,592	28.9	23.5
Psychologists	16,125	12,509	6.2	77.6	3,616	9.9	22.4
Social scientists	52,051	43,903	21.7	84.3	8,148	22.2	15.7
Economists	10,230	9,356	4.6	91.5	874	2.4	8.5
Sociologists	10,777	8,147	4.0	75.6	2,630	7.2	24.4
Political scientists	8,741	7,842	3.9	89.7	899	2.5	10.3
Historians	13,572	11,804	5.8	87.0	1,768	4.8	13.0
Other social scientists	8,731	6,754	3.3	77.4	1,977	5.4	22.6

Source: National Science Foundation

There appears to have been a slight shift, however, in employment of women scientists and engineers from bachelor-granting and 2-year institutions to graduate institutions from 1974-75. At the doctorate-granting institutions female employment grew at nearly four times the rate of men, and at master's institutions growth in female S/E employment was more than twice that of males. At both the bachelor's and 2-year institutions, however, female S/E employment declined both in absolute terms and in terms of their relative share of total S/E employment.

The ratio of women to men employed as scientists and engineers was higher at undergraduate institutions than at graduate institutions. In 1975 women comprised 18 percent of all full-time scientists and engineers at undergraduate institutions but only 14 percent of full-timers at institutions awarding graduate degrees (table 5). Academic institutions showed even wider differences by level and type of control in the employment of women scientists and engineers. With the exception of one small category of institutions that award a bachelor's or higher degree in non-S/E fields, private institutions showed equal or higher women employment levels than public institutions. For example, public institutions awarding a bachelor's degree in the sciences or engineering showed a 13-percent level of women employed, compared to 17 percent at private institutions. At the 2-year level women made up 20 percent of full-time scientists and engineers employed at public 2-year institutions compared to 27 percent at private 2-year institutions.

Table 5.—Number of full-time scientists and engineers employed at universities and colleges, by type of institution, control, and sex: January 1975

Type of institution and control	Total	Men			Women		
		Number	Percent distribution	Percent of total	Number	Percent distribution	Percent of total
All institutions:							
Total	239,212	202,562	100.0	84.7	36,650	100.0	15.3
Public	167,704	142,266	70.2	84.8	25,438	69.4	15.2
Private	71,508	60,296	29.8	84.3	11,212	30.6	15.7
Institutions granting:							
Doctorate in S/E							
Total	154,922	132,448	65.4	85.5	22,474	61.3	14.5
Public	108,070	92,410	45.6	85.5	15,660	42.7	14.5
Private	46,852	40,038	19.8	85.5	6,814	18.6	14.5
Master's in S/E							
Total	30,675	26,325	13.0	85.8	4,350	11.9	14.2
Public	25,008	21,597	10.7	86.4	3,411	9.3	13.6
Private	5,667	4,728	2.3	83.4	939	2.6	16.6
Bachelor's in S/E							
Total	25,784	21,754	10.7	84.4	4,030	11.0	15.6
Public	9,416	8,214	4.1	87.2	1,202	3.3	12.8
Private	16,368	13,540	6.7	82.7	2,828	7.7	17.3
Other than science:							
Total	951	783	.4	82.3	168	.5	17.7
Public	193	154	.1	79.8	39	.1	20.2
Private	758	629	.3	83.0	129	.4	17.0
Two-year institutions:							
Total	26,880	21,252	10.5	79.1	5,628	15.4	20.9
Public	25,017	19,891	9.8	79.5	5,126	14.0	20.5
Private	1,863	1,361	.7	73.1	502	1.4	26.9

Source: National Science Foundation

At the 2-year institutions women represented a 44 percent larger share of full-time scientists and engineers than at doctorate-granting institutions. One of the reasons for this difference is the academic requirement for faculty positions at these two types of institutions. Possession of a doctorate degree is one of the chief requirements for employment in most positions at doctorate-granting institutions while it does not constitute a requirement for most positions at 2-year institutions. Since a relatively low proportion of women traditionally have gone on to obtain a doctorate degree, it is not surprising that the proportion of women employed as scientists and engineers at doctorate-granting institutions falls well below that at 2-year institutions.

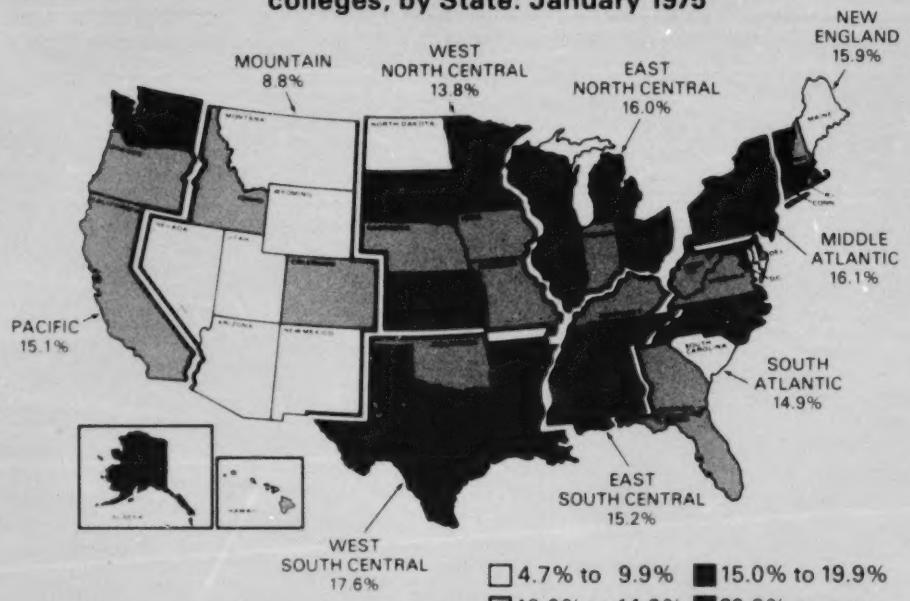
It should be noted, however, that another recent NSF survey of graduate science enrollment indicates that this trend may be changing.[6] In the fall of 1974, for example, the number of women enrolled full time in graduate science programs went up almost 13 percent, while men increased by only 3 percent. In 1974 women represented 24 percent of the graduate science enrollment, up considerably from their 19-percent share in 1973.

[6] See National Science Foundation, *Science Resources Studies Highlights*, "Graduate Science Enrollment in 1974 Shows First Increase Since 1969" (NSF 75-328) (Washington, D.C. 20550, Oct. 22, 1975).

On a geographic basis, women employment levels varied from 5 percent in Utah to 22 percent in Connecticut. States with low populations tended to show low percentages of women employed. The entire Mountain division—comprised of Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming—averaged 9 percent in employment of women scientists and engineers. Within this group of States, only Colorado and Idaho institutions showed women employment levels above 10 percent.

Institutions in a few of the most populous States reported lower employment levels of female scientists and engineers than the national average. For example, in California female employment averaged 14 percent, slightly below the national average.

Relative employment levels of women scientists/engineers employed at universities and colleges, by State: January 1975



SOURCE: National Science Foundation.

Among 50 leading universities in employment of full-time scientists and engineers, more than one-fourth showed declines in full-time employment from 1974-75. These reductions reflect an effort on the part of several leading institutions to trim portions of their staff because of adverse financial conditions.

While a number of academic institutions have been faced with the need to reduce employment levels from 1974-75, some of the most prominent ones, including the Massachusetts Institute of Technology (MIT) and Harvard University, also are faced with increasing budget deficits in 1976 according to a recent article.[7] As in many other institutions the deficits are attributable to inflation (e.g., rising energy costs) combined with reduced income from endowments and limitations on the size of tuition increases.

There is wide variation in the relative levels of women employed as full-time scientists and engineers at individual academic institutions in January 1975. For the 50 institutions shown in table 6, the proportions ranged from 6 percent at the University of Missouri at Columbia to 29 percent at Yale University. Even among the first 10 universities the proportions vary greatly, from 8 percent at Pennsylvania State University to 26 percent at the University of Washington.

In terms of absolute numbers of women employed, the leading institutions were the University of Michigan (774), the University of Wisconsin-Madison (562), the University of Washington (555), Ohio State University (485), and Yale University (480).

In reviewing women employment data at an institution level one should take into account the fields of science emphasized by a particular institution and whether women are well represented in these fields at an aggregate level. For example, an institution that places a relatively heavy emphasis on programs in the physical sciences and engineering might be expected to show a below-average proportion of total women employed in all S/E fields.

[7] Deborah Shapley, "Harvard, MIT Face Limits to Growth," *Science* (Mar. 14, 1975), p. 939.

TABLE 6. DISTRIBUTION OF FULL-TIME SCIENTISTS AND ENGINEERS AT 50 LEADING DOCTORATE GRANTING INSTITUTIONS, BY EMPLOYMENT CATEGORY AND SEX: JANUARY 1975

	TOTAL, ALL CATEGORIES		ENGINEERING		PHYSICAL SCIENCES		ENVIRONMENTAL SCIENCES		MATHEMATICAL SCIENCES		LIFE SCIENCES		PSYCHOLOGY		SOCIAL SCIENCES	
	GRAND TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN
TOTAL, ALL DOCTORATE INSTITUTIONS	154922	22474	36611	310	14940	829	4383	200	9686	877	77536	15250	7429	1461	24346	3531
1 UNIVERSITY OF MICHIGAN	3293	774	348	21	263	36	82	2	123	12	1889	561	154	45	434	97
2 HARVARD UNIVERSITY	2909	374	43	1	241	17	16	0	41	4	2343	325	31	9	174	18
3 UNIVERSITY OF MINNESOTA	2782	438	184	1	163	8	61	3	136	10	1551	281	121	40	566	115
4 UNIV OF WISCONSIN-MADISON	2726	562	239	17	262	14	130	15	111	3	1340	336	213	71	434	106
5 OHIO STATE UNIVERSITY	2369	485	263	4	157	5	53	1	100	6	1454	426	48	5	294	38
6 TEXAS A & M UNIVERSITY	2324	474	349	6	96	1	67	3	61	5	1379	410	29	8	343	41
7 UNIVERSITY OF WASHINGTON	2095	555	176	3	109	6	160	8	65	2	1396	513	38	9	151	17
8 UNIV ILLINOIS URBANA	2037	319	354	7	210	11	36	2	200	25	915	244	89	12	233	18
9 UNIVERSITY OF FLORIDA	1965	162	183	2	149	2	34	0	91	7	1123	90	85	12	298	49
10 PENNSYLVANIA STATE UNIV	1930	148	443	5	204	10	98	2	174	19	884	70	82	18	253	24
TOTAL 1ST 10 INSTS.	24431	4291	2582	67	1854	110	729	36	1102	93	14074	3296	910	284	3180	523
11 JOHNS HOPKINS UNIVERSITY	1889	263	55	1	95	6	31	1	55	8	1508	219	30	8	123	20
12 UNIV OF TEXAS AT AUSTIN	1743	353	270	30	405	30	116	19	145	21	242	94	145	44	420	115
13 MASS INST OF TECHNOLOGY	1711	227	766	61	290	23	80	15	131	13	239	91	23	6	182	18
14 CORNELL UNIVERSITY	1709	208	246	6	149	8	44	1	42	0	868	113	28	7	332	73
15 YALE UNIVERSITY	1677	480	53	0	137	11	37	3	44	1	1191	418	49	24	166	23
16 STANFORD UNIVERSITY	1660	282	210	5	153	6	36	1	70	4	1026	233	31	10	134	23
17 WASHINGTON UNIV ST LOUIS	1608	264	72	1	54	4	11	3	27	0	1321	237	25	5	98	16
18 UNIVERSITY OF PITTSBURGH	1603	451	123	2	126	6	17	0	112	21	678	330	119	49	234	43
19 PURDUE UNIV ALL CAMPUSES	1582	150	330	4	186	6	24	1	159	14	572	86	66	10	245	29
20 MICHIGAN STATE UNIVERSITY	1574	189	118	0	173	5	35	0	138	11	703	113	114	21	301	39
TOTAL 1ST 20 INSTS.	41187	7158	4825	177	3622	215	1160	85	2017	186	22614	5190	1534	388	5415	922
21 UNIV OF NORTH CAROLINA CHAPEL HILL	1567	279	0	0	98	2	39	5	60	1	1061	214	97	12	252	45
22 U OF CAL LOS ANGELES	1512	185	150	3	155	7	52	3	71	6	744	129	67	11	273	28
23 RUTGERS THE STATE UNIV	1461	275	91	0	144	13	65	6	152	30	419	74	110	31	484	121
24 UNIV OF MD COLLEGE PARK	1409	219	157	2	281	8	16	1	131	12	456	126	127	32	241	38
25 U OF CAL BERKELEY 1/	1402	159	281	5	187	14	20	0	79	4	474	80	48	11	313	45
26 WAYNE STATE UNIVERSITY 1/	1382	252	82	1	94	7	9	0	73	4	894	188	48	6	182	46
27 NEW YORK UNIVERSITY	1377	279	9	1	102	3	1	0	95	5	844	225	79	20	247	25
28 COLUMBIA UNIV MAIN DIV	1343	236	105	3	149	6	87	3	35	2	771	200	33	8	163	14
29 CASE WESTERN RESERVE UNIV	1308	190	112	2	92	4	12	0	39	4	946	165	36	3	71	12
30 UNIV OF PENNSYLVANIA	1298	208	96	5	99	2	6	0	54	7	834	162	25	6	184	26
TOTAL 1ST 30 INSTS.	55246	9440	5908	199	5023	281	1467	98	2806	269	30853	6753	2164	528	7825	1322
31 UNIVERSITY OF CHICAGO	1273	202	33	0	178	8	41	2	66	1	752	152	50	14	161	25
32 UNIV OF MISSOURI COLUMBIA	1245	69	120	0	72	0	18	1	48	0	748	38	44	8	195	22
33 UNIV OF STHRN CALIFORNIA	1232	174	132	3	70	5	21	2	64	2	777	143	57	5	131	14
34 DUKE UNIVERSITY	1210	203	42	0	64	2	14	2	32	5	890	175	30	4	138	15
35 UNIVERSITY OF ARIZONA	1206	97	122	2	186	11	73	2	108	14	498	43	57	13	174	12
36 LA ST U BATON ROUGE	1189	256	103	0	76	1	47	4	75	10	762	214	22	4	122	23
37 UNIVERSITY OF IOWA	1186	148	64	1	74	0	13	0	59	4	771	124	31	4	174	15
38 UNIVERSITY OF KANSAS	1180	224	79	0	83	0	49	5	65	6	589	134	94	22	223	57
39 UNIVERSITY OF COLORADO	1124	114	127	1	176	3	23	0	72	7	496	78	65	7	165	18
40 U OF CAL DAVIS	1114	88	76	1	73	0	32	0	31	1	698	58	16	0	188	28
TOTAL 1ST 40 INSTS.	67207	11015	6860	207	6067	311	1798	116	3628	389	37006	7912	2608	689	9496	1551
41 IOWA ST U OF SCI & TECH	1113	103	305	3	83	3	40	0	86	5	395	42	25	4	179	46
42 TEMPLE UNIVERSITY	1104	193	27	0	68	4	0	0	71	6	620	124	117	29	201	30
43 UNIVERSITY OF GEORGIA	1033	77	24	0	86	6	37	3	62	5	545	61	95	16	186	9
44 UNIV OF HAWAII AT MANOA	972	132	87	2	67	3	74	2	41	3	489	81	43	6	249	35
45 OREGON STATE UNIVERSITY	962	88	118	1	98	4	98	3	73	4	437	54	18	6	130	16
46 WEST VIRGINIA UNIVERSITY	959	96	123	4	38	1	14	0	43	10	614	68	36	7	91	6
47 UNIVERSITY OF ARKANSAS	953	203	91	0	49	2	11	1	24	4	620	164	16	3	140	29
48 UNIVERSITY OF CONNECTICUT	945	182	82	1	73	4	35	4	44	4	492	145	63	12	156	12
49 NORTHWESTERN UNIVERSITY	942	80	128	3	104	4	14	0	69	4	431	50	16	3	180	16
50 UNIV OF KENTUCKY ALL CAM	907	52	69	0	40	1	12	1	66	2	525	42	87	2	138	4
TOTAL 1ST 50 INSTS.	77099	12221	7880	221	6763	343	2133	130	4005	356	42094	8723	3078	696	11146	1754
TOTAL ALL OTHER INSTS.	77823	10253	8731	97	8177	486	2250	70	5881	521	35442	6535	4142	767	13200	1777

1/ All data are approximate.

NOTE: TABLE DOES NOT INCLUDE ANY LEADING INSTITUTION THAT (1) REQUIRED NATIONAL SCIENCE FOUNDATION ESTIMATES, OR (2) REQUESTED THAT ITS DATA BE HELD CONFIDENTIAL.

SOURCE: NATIONAL SCIENCE FOUNDATION

Section 2. EMPLOYMENT OF GRADUATE STUDENTS

In addition to the 297,000 scientists and engineers discussed in section 1, universities and colleges also employed 99,300 graduate students as scientists and engineers on a part-time basis, approximately 37 percent of all graduate students enrolled in the sciences and engineering. This category includes students enrolled in a course of study designed to lead to an advanced degree who receive compensation as teaching or research assistants or who receive duty stipends such as scholarships, fellowships, or other awards requiring the performance of professional services in the sciences or engineering to qualify for the stipend. Graduate students receiving nonduty stipends such as fellowships or traineeships that do not require the performance of professional duties are excluded, as well as those who may be engaged in teaching or research on a voluntary basis. Also excluded are those whose assigned duties are primarily at a technical or subprofessional level, or who, while taking one or two graduate courses, hold full-time appointments. Such persons are reported as technicians and as full-time scientists and engineers, respectively.

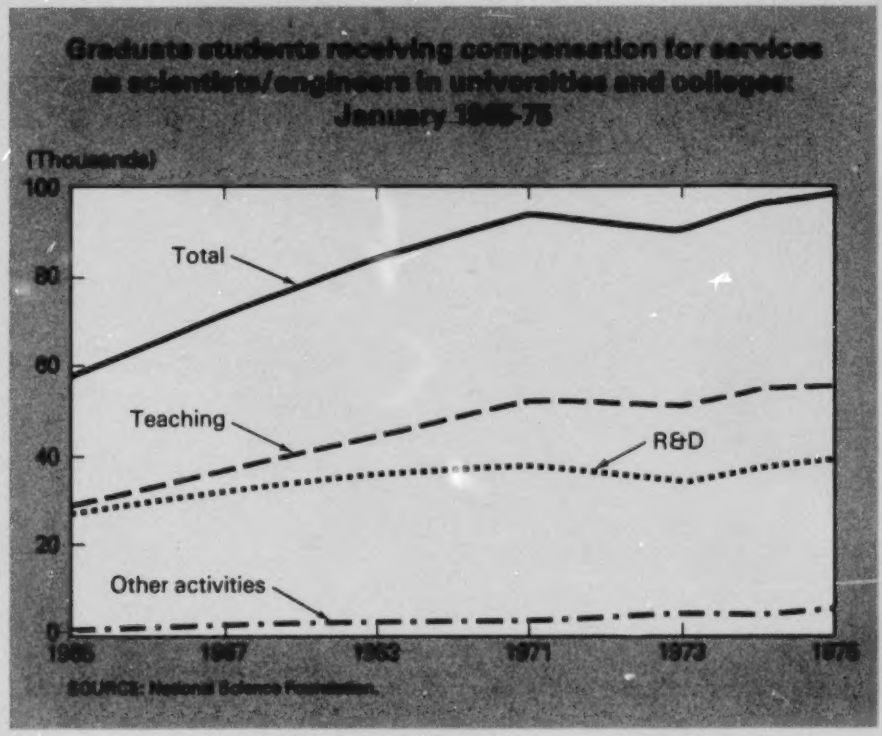
Through a combination of work and study, the graduate students reported in this section are able to enhance professional qualifications in their disciplines while contributing valuable services in assisting the senior staff of their institutions. The most important consideration for many of these students, however, is the fact that they are able to finance a substantial portion, if not all, of the costs of their graduate education through their duty stipends.[a]

[a] For detailed data on the sources and types of support for graduate students, see National Science Foundation, *Detailed Statistical Tables. Graduate Science Education: Student Support and Postdoctorals, Fall 1974.* (NSF 75-322) (Washington, D.C. 20550, 1975).

Trends, 1965-75

The 99,300 graduate students employed in January 1975 represented an increase of 3 percent over the previous year. This is only one-half the rate of increase from 1973 to 1974, but nearly three times the average annual rate since 1971. These very low growth rates stand in sharp contrast to the 8-percent average annual growth rate during the 1965-71 period. The year 1971 is significant in that Federal obligations in support of graduate education first began to decline at that time.

The pattern of rapid increases prior to 1971 and slower increases thereafter parallels that of scientists and engineers. In the latter case, a 7-percent annual rate of increase during the earlier period gave way to a 2-percent rate since 1971.



Rapid increases characterized all three types of activity between 1965 and 1971. By contrast, during the 1971-74 period graduate students primarily engaged in teaching increased only slightly, while those primarily in research and development and in other activities showed slight declines. Between 1974 and 1975, however, increases were reported in all three activities.

Field of Employment

The largest number of graduate students working as scientists and engineers in 1975 were in the life sciences—26,800 or 27 percent of the total. Those in the physical sciences, the second largest group, accounted for 18 percent of the total, while those in the social sciences made up another 17 percent.

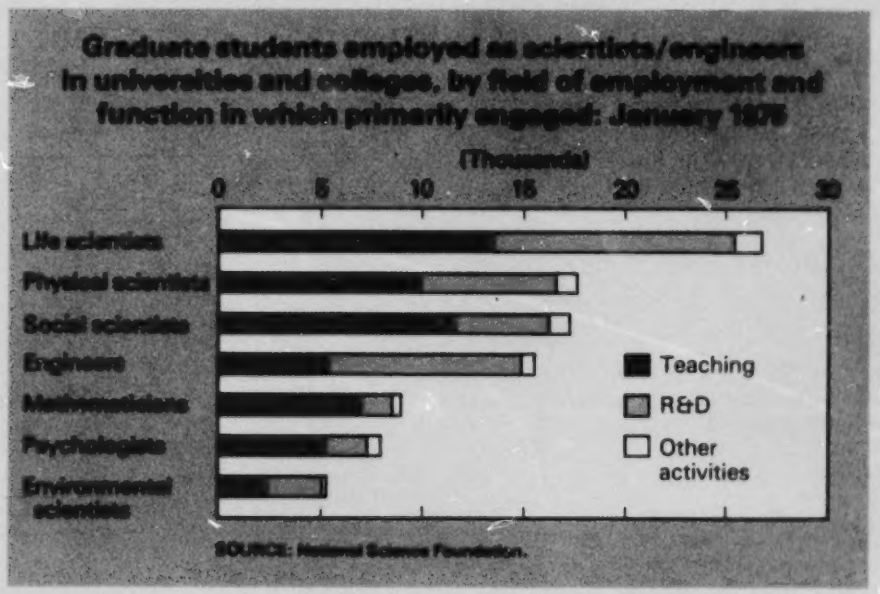


Table 7.—Change in numbers of graduate students employed as scientists and engineers at universities and colleges, by field of employment: January 1973-75

Field of employment	Number Jan. 1973	Number Jan. 1974	Percent change 1973-74	Number Jan. 1975	Percent change 1974-75
Total, all fields	90,450	96,186	6.3	99,294	3.2
Engineers	13,723	14,931	8.8	15,524	4.0
Physical scientists	17,824	18,255	2.4	17,771	-2.7
Environmental scientists	4,241	4,700	27.9	5,360	14.0
Mathematical scientists	8,442	8,683	2.9	8,687	(1)
Life scientists	23,245	25,183	8.3	26,753	6.2
Psychologists	6,688	7,422	11.0	7,991	7.7
Social scientists	16,287	17,012	4.5	17,208	1.2

(1) Less than 0.05 percent.
Source: National Science Foundation.

Among the graduate students primarily engaged in teaching in 1975, those in the life sciences led with 13,600, or 24 percent of the total. The second largest number were employed in the social sciences, with 21 percent of the total. Those in the physical sciences accounted for 19 percent.

In research and development, however, engineers made up nearly one-fourth of the total—more than any other group except life scientists. Among major fields, only in engineering and the environmental sciences did graduate students primarily engaged in research and development outnumber those in teaching.

The increase in numbers of graduate students employed between 1973 and 1975 affected all broad fields except the physical sciences. In all cases, the rate of increase was lower in the 1974-75 period than in the 1973-74 period. Rates of increase were highest in the environmental sciences during both periods, and lowest in the mathematical sciences. The number employed in the physical sciences decreased more rapidly between 1974 and 1975 than during the earlier period (table 7).

Type of Institution

Of all graduate students receiving compensation for services as scientists and engineers in 1975, 94,000, or 95 percent, were employed in doctorate-granting institutions. Such institutions employed 93 percent of those primarily engaged in teaching, 99 percent of those in research and development, and 86 percent of those in other activities. In January 1974, the proportion employed in doctorate-granting institutions was 94 percent, including 93 percent of those in teaching, 98 percent of those in research and development, and 89 percent of those in other activities.[a]

Concentration in doctorate-level institutions was most pronounced in engineering, where 99 percent were reported. Proportions in doctorate-level institutions ranged between 89 percent and 96 percent in the other major fields (table 8).

Table 8.—Percent distribution of graduate students employed as scientists and engineers at graduate institutions, by type of activity, field, and type of institution: January 1975

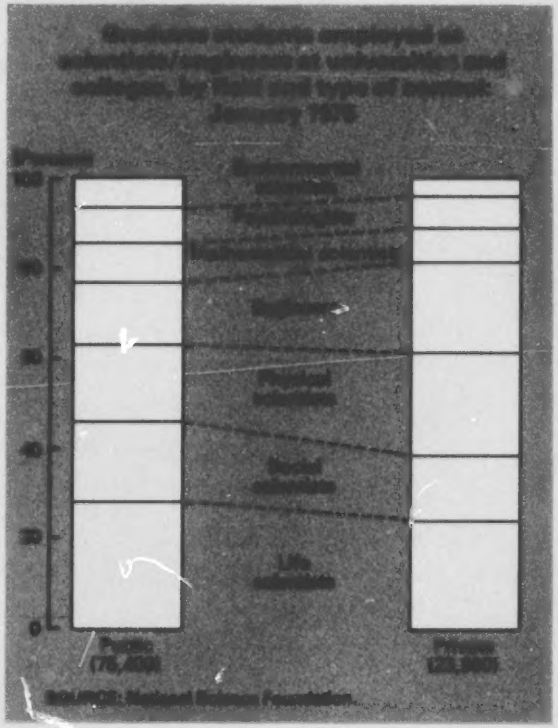
Item	Total	Type of institution	
		Doctorate-granting	Master's-granting
Total	100	95	5
Type of activity:			
Teaching	100	93	7
R&D	100	99	1
Other activities	100	86	14
Field of employment:			
Engineers	100	99	1
Physical scientists	100	95	5
Environmental scientists	100	96	4
Mathematical scientists	100	93	7
Life scientists	100	95	5
Psychologists	100	89	11
Social scientists	100	93	7

Source: National Science Foundation

Type of Control

Public institutions employed about three-times as many graduate students in 1975 as did private institutions (75,400 and 23,900, respectively). Those employed in public universities and colleges included 77 percent of all graduate students primarily engaged in either teaching or other activities, and 74 percent of those whose primary function was research and development.

Graduate students working in the life sciences made up the largest single group in both public and private institutions—28 percent in public institutions and 24 percent in private institutions. Those in the social sciences, the second largest group in public institutions with 18 percent of the total, ranked fourth in private institutions with 15 percent of the total. Conversely, the proportions represented by those in engineering and the physical sciences were significantly higher in private institutions than in public. Engineers represented 20 percent of those in private institutions but only 14 percent in those under public control, while physical scientists made up 22 percent in private institutions, but only 17 percent in public institutions.



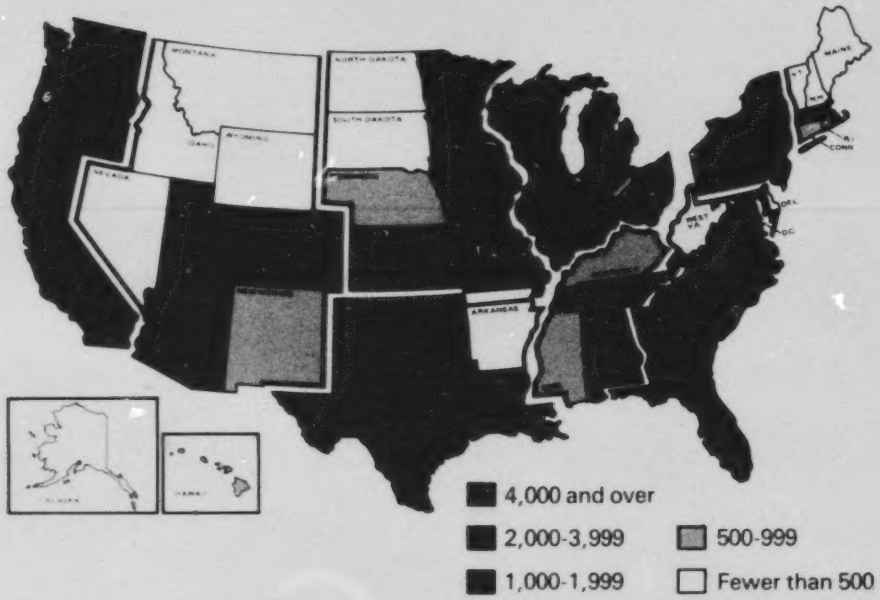
[a] Only graduate-level institutions (doctorate- or master's-granting) are included in this section. Graduate students employed by institutions other than those at which they were enrolled were reported as "scientists and engineers."

Geographic Distribution

Employment of graduate students as scientists and engineers tended to be concentrated more heavily in a few States than employment of all other academic scientists and engineers. The 10 leading States employed 55 percent of all graduate students working as scientists and engineers in the United States; more than one-third were employed in the top five States.

New York institutions reported the largest number of graduate students employed, nearly 8,600; California followed with 8,000. Together, these two States accounted for one-sixth of the total.

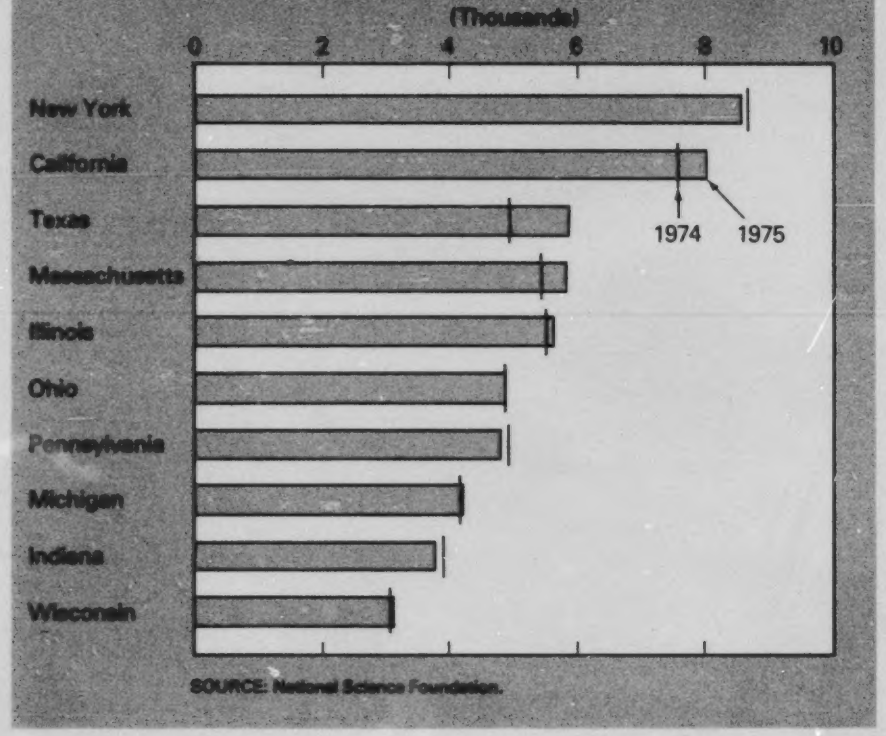
Geographic distribution of graduate students employed as scientists/engineers at universities and colleges: January 1975



SOURCE: National Science Foundation.

Between 1974 and 1975, the number of graduate students employed in the 10 leading States increased at a slightly slower rate than those in the States ranked lower, 3 percent compared to 4 percent. Three of the 10 States showed actual declines: New York (1 percent), Pennsylvania (3 percent), and Indiana (5 percent). These decreases were offset by a few States with much higher rates of increase than the average; for instance, employed graduate students in Texas increased by 19 percent; those in Massachusetts, by 8 percent; and those in California, by 6 percent.

Graduate students employed as scientists/engineers at universities and colleges in 10 States leading in employment of graduate students: January 1974-75

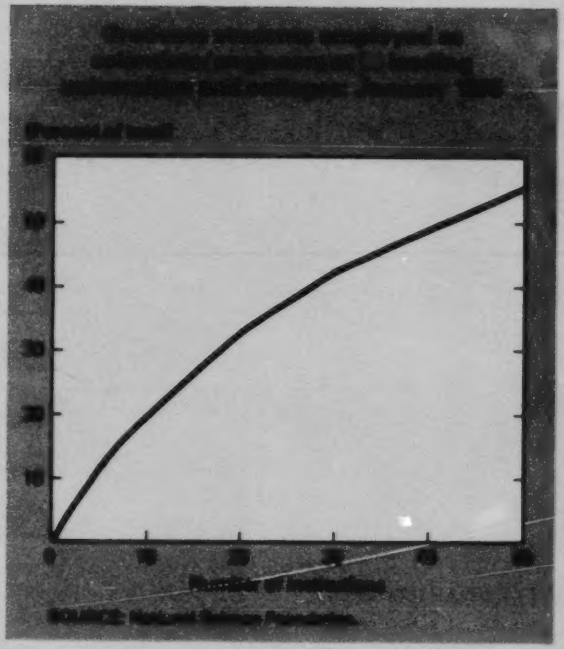


SOURCE: National Science Foundation.

Institutional Distribution

Fifty institutions accounted for 56 percent of all graduate students employed as scientists and engineers at universities and colleges in the United States. Of these, five employed more than 2,000 each and another 18 employed between 1,000 and 2,000; these 23 institutions made up 36 percent of the total.

The total for the 10 leading institutions increased at about the same rate as that for all institutions between 1974 and 1975, slightly over 3 percent. Two of the ten, however, Purdue and MIT, reported slight declines (less than 1 percent in both cases), while four others reported much higher rates of increase than the average: the University of Minnesota (9 percent), Harvard University (6 percent), and Ohio State University and the University of California at Berkeley (both 5 percent).



Section 3. EMPLOYMENT OF TECHNICIANS

The 297,200 scientists and engineers reported in section 1 were assisted in the performance of their research, teaching, and administrative functions by 57,100 technicians. Technicians, as defined in this survey, include all persons employed in positions which involve technical work at a level requiring knowledge in any S/E field comparable to that acquired through formal post-high school training (less than a bachelor's degree), such as that obtained at technical institutes or junior colleges or through equivalent on-the-job training or experience. Included are laboratory assistants, physical science aides, engineering aides, statistical aides, draftsmen, or computer programmers. All personnel performing such duties are included, even if they held a bachelor's or higher degree. Graduate students reported in the previous section are excluded, as are craftsmen such as electricians, carpenters, machinists, etc.

In 1975 the ratio of technicians to FTE scientists and engineers was about 20 per 100, substantially the same as in the prior year. The proportion by type of activity differed substantially, however. In each of the last 2 years technicians reported in research and development represented approximately 70 per 100 FTE research scientists and engineers while those primarily engaged in other activities (including teaching) amounted to about 10 per 100.

Trends

The 57,100 technicians employed in universities and colleges in January 1975 represented an increase of 6 percent over the previous year's total. While lower than the 9-percent rate of the 1965-69 period, it was significantly higher than the 3-percent growth between 1969 and 1974. The increase between 1974 and 1975 was largely due to a 16-percent increase in the number primarily engaged in activities other than research and development; R&D technicians increased by only one-half of 1 percent during this period (table 9).

The consistently higher rates of increase in non-R&D technicians were reflected in the shifting functional distribution. In the midsixties, R&D technicians made up 72 percent of the total, but by 1975 the proportion was only 63 percent.

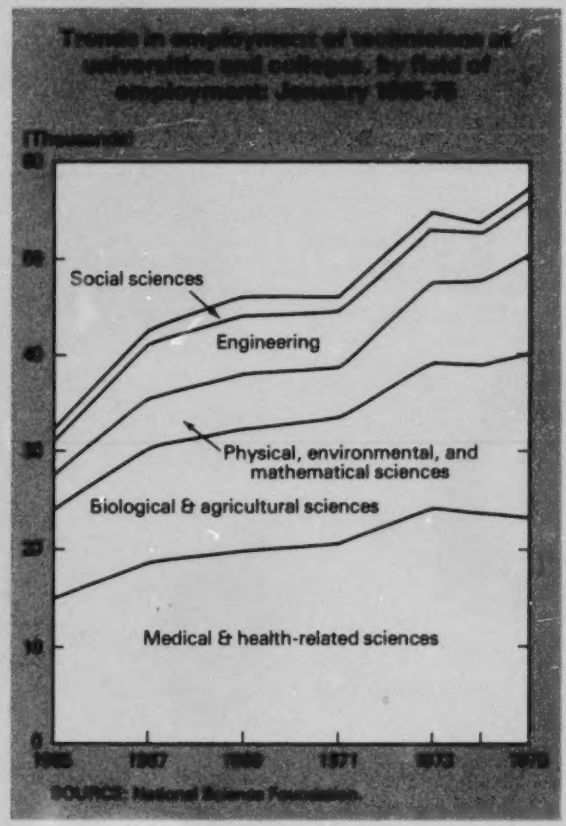
Table 9.—Trends in the employment of technicians at universities and colleges, by type of activity, January 1965-75

Year	Total	R&D	Other activities
1965	32,261	23,118	9,143
1967	42,713	30,919	11,794
1969	46,192	32,254	13,938
1971	46,013	31,909	14,104
1973	54,843	36,682	18,161
1974	53,945	35,925	18,020
1945	57,082	36,106	20,976
Annual percent change			
1965-69	9.4	8.7	11.1
1969-74	3.2	2.2	5.3
1974-75	5.8	.5	16.4

Source: National Science Foundation

Field of Employment

Technicians in medical and health-related occupations, though declining in numbers from their 1973 high, were still the largest single group in 1975, with 39 percent of the total. As in all earlier surveys in the series, biological science technicians (29 percent of the total) made up the second largest field.



While 80 percent of the biological and agricultural science technicians—and about the same proportion of those in the environmental sciences—were primarily engaged in activities related to research and development in 1975, only 32 percent of all mathematical technicians were primarily engaged in R&D activities. It should be noted, however, that computer programmers were included in this category and accounted for a substantial number of those in other activities (table 10).

Table 10.—Technicians employed at universities and colleges, by field and type of activity: January 1975

Field	Total	R&D	Other activities
Total, all fields	57,082	36,106	20,976
Engineering technicians	5,441	3,006	2,435
Physical science technicians	4,892	2,767	2,125
Environmental science technicians	1,461	1,141	320
Mathematics technicians	3,905	1,237	2,668
Biological & agricultural science technicians	16,657	13,292	3,365
Medical & health-related technicians	22,447	13,244	9,203
Psychology technicians	1,031	696	335
Social science technicians	1,248	723	525

Source: National Science Foundation.

Type of Institution

Doctorate-granting institutions employed 91 percent of all technicians in the academic sector, and 98 percent of those primarily engaged in R&D activities. Institutions granting master's degrees accounted for 3 percent, baccalaureate institutions for 2 percent, while junior colleges and institutions granting degrees only in nonscience fields made up the remaining 4 percent. By comparison, doctorate institutions accounted for 95 percent of all employed graduate students but only 63 percent of all scientists and engineers.

R&D technicians comprised a majority only in doctorate-level institutions. Those in non-R&D activities made up 76 percent of all technicians at the master's-granting level, 78 percent in institutions granting only a baccalaureate, and 93 percent in colleges not granting science degrees. (table 11).

Table 11.—Technicians employed at universities and colleges, by level of institution and type of activity: January 1975

Level of institution	Total	R&D	Other activities
Total, all institutions	57,082	36,106	20,976
Doctorate-granting	51,956	35,246	16,710
Master's-granting	1,887	456	1,431
Bachelor's-granting	1,232	267	965
Other institutions	2,007	137	1,870

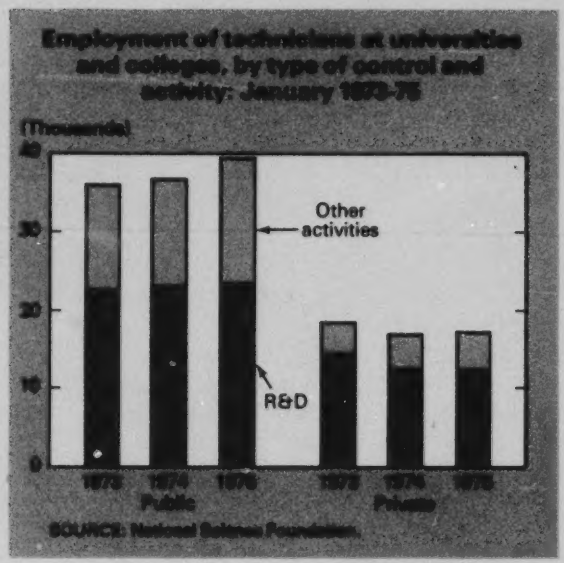
Source: National Science Foundation.

Type of Control

Of the 57,100 technicians employed in all universities and colleges in 1975, 39,700, or 70 percent, were in publicly controlled institutions. In 1974, by comparison, public institutions employed 68 percent of all technicians, and in 1973, 66 percent.

Employment of technicians in publicly controlled institutions during the 1973-75 period rose at an average rate of 5 percent, increasing by 2 percent between 1973 and 1974 and by more than 8 percent between 1974 and 1975. During the last 2 survey years, the employment of technicians in private academic institutions actually declined at a rate of nearly 4 percent per year (an 8-percent decline from 1973 to 1974 followed by an increase of about one-half of 1 percent from 1974 to 1975).

Technicians primarily employed in R&D-related activities accounted for a smaller proportion of the total in public institutions than in private institutions—59 percent compared to 72 percent. By comparison, R&D scientists and engineers comprised 15 percent of those employed in public institutions and 20 percent of those in private institutions, while among employed graduate students, 38 percent in public institutions and 43 percent of those in private institutions were primarily engaged in R&D activities.



Part II
FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS

Section 1. EMPLOYMENT OF SCIENTISTS AND ENGINEERS

Federally Funded Research and Development Centers (FFRDC's) are organizations exclusively or substantially financed by the Federal Government and administered on a contractual basis by educational institutions or other organizations. These organizations were established either to meet a particular R&D objective of the sponsoring agency or, in some instances, to provide major facilities at universities for research and instruction.

FFRDC's are administered by universities and university consortia, independent nonprofit institutions, and industrial firms. This report is limited to data on the manpower characteristics of the 21 FFRDC's administered by universities and university consortia. Data presented here are excluded from the data for universities and colleges shown in part I of this report.

Each FFRDC is a separate operational unit and a self-contained entity insofar as its R&D work is concerned. Although several FFRDC's are physically located at considerable distances from their parent institutions—such as the National Astronomy and Ionosphere Center at Arecibo, P.R., administered by Cornell University (Ithaca, N.Y.)—most are in close proximity to their respective universities. Staffs are normally separate from those of the university, but in some cases, staff members also hold faculty appointments in the parent university. Most FFRDC's make their extensive facilities available to faculty and graduate students of the administering university for the conduct of research. Scientists and engineers whose primary employment is in universities and colleges, but who may perform some work in FFRDC's, are included in part I of this report and excluded from part II.

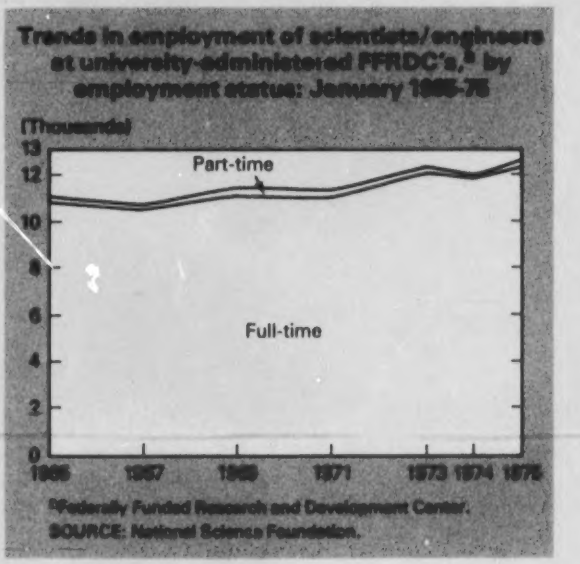
Trends

The 12,500 scientists and engineers employed in FFRDC's in January 1975 represented an increase of 5 percent over the 12,000 reported in 1974. By comparison, between 1971 and 1974 the annual average increase was 2 percent, and between 1965 and 1971, only one-half of 1 percent. It should be noted, however, that the figures for the earlier years are not strictly comparable, since they include a number of organizations which have subsequently ceased operation or are no longer classified as FFRDC's.

The comparable rates of increase for those 16 FFRDC's which have been in existence throughout the survey period are higher than the rates for all institutions. From 1965 to 1971 this smaller group increased by 2 percent per year, from 1971 to 1974, 3 percent; and from 1974 to 1975, 5 percent. This group includes all of the larger FFRDC's; the five centers established since the inception of the series in 1965 together employed less than 4 percent of the scientists and engineers.

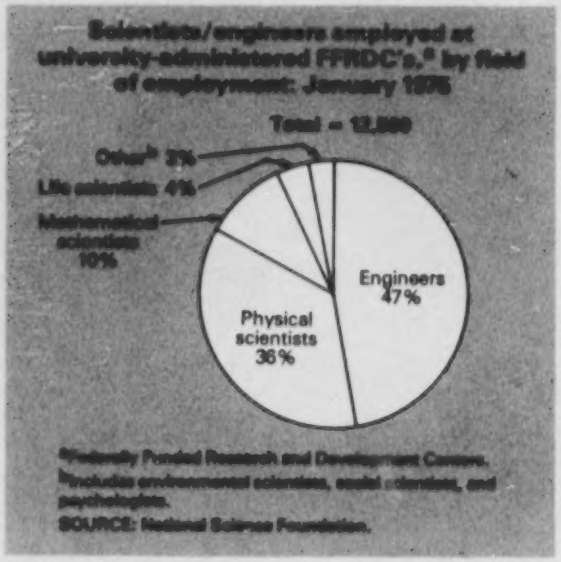
In each of the survey years, almost all scientists and engineers in FFRDC's were employed on a full-time basis on R&D activities. The proportion of full-timers ranged between 97 percent and 99 percent throughout the 1965-75 period. By comparison, full-timers accounted for approximately four-fifths of those employed in universities and colleges over the same 10-year period.

The proportion of scientists and engineers primarily engaged in R&D activities at FFRDC's also ranged between 97 percent to 99 percent from 1965-75.



Field of Employment

Four out of five scientists and engineers employed in university-administered FFRDC's were working in either engineering or the physical sciences. Engineers made up 47 percent of the total, while physical scientists comprised another 36 percent. Of the remainder, more than one-half were mathematical scientists. Environmental, life, and social scientists and psychologists together accounted for only 7 percent of the total.


Scientists/engineers employed at university-administered FFRDC's,[a] by field of employment: January 1975
Total = 12,500
Other[b] 3%
Life scientists 4%
Mathematical scientists 10%
Engineers 47%
Physical scientists 36%
[a]Federally Funded Research and Development Centers.
[b]Includes environmental scientists, social scientists, and psychologists.
SOURCE: National Science Foundation.

The largest proportional change was in the number of environmental scientists, an increase of 42 percent over the January 1974 figure; mathematical scientists increased at the second fastest rate, 23 percent. Employment in all other broad fields increased at rates close to the average except psychologists, which remained level, and social scientists, which decreased at a rate of 22 percent (table 12).

Table 12.—Scientists and engineers employed in university-administered FFRDC's, by field of employment: January 1974-75

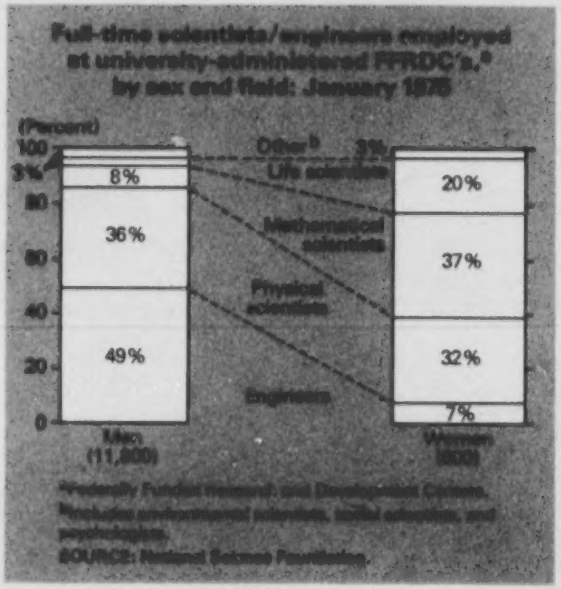
Field	1974	1975	Percent change
Total, all fields	11,974	12,546	4.8
Engineers	5,705	5,842	2.4
Physical scientists	4,422	4,560	3.1
Environmental scientists	180	256	42.2
Mathematical scientists	1,011	1,240	22.7
Life scientists	470	500	6.4
Psychologists	10	10	—
Social scientists	176	138	-21.6

Source: National Science Foundation

Sex Distribution

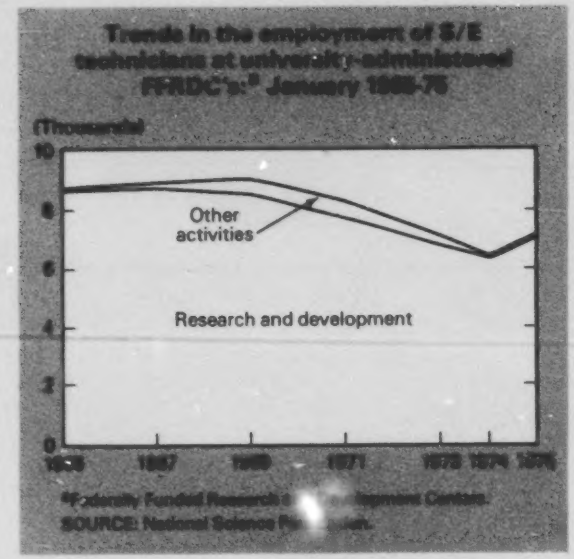
Women comprised 5 percent of all full-time scientists and engineers in 1975, compared to 4 percent in 1974. This change reflects a rise of 15 percent in the number of women employed full time between the 2 survey years in which such data have been requested, while the number of men working in such positions rose by 4 percent.

The field distribution of women employed as scientists and engineers differed sharply from that of their male colleagues. The largest number, 37 percent of the total, were employed in the mathematical sciences. Physical scientists accounted for 32 percent of the total, and life scientists another 20 percent. Only 7 percent of the women scientists and engineers were working in engineering, compared to 49 percent of the men.



Section 2. EMPLOYMENT OF TECHNICIANS

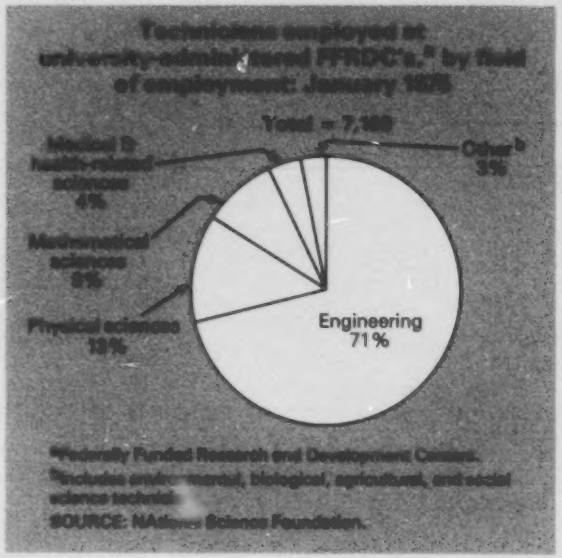
The 12,500 scientists and engineers employed in FFRDC's were assisted by 7,100 technicians, a ratio of 57 technicians per 100 scientists and engineers. Of these, more than 99 percent were primarily employed in R&D-related activities. By contrast, in universities and colleges only 19 technicians were employed per 100 scientists and engineers and of these, only 63 percent were primarily engaged in research and development.



Trends

The 7,100 technicians employed in January 1975 represent a 12-percent increase over the 6,400 employed in January 1974. This marks the reversal of a 7-percent per year decline which began in 1969, when the FFRDC's then in existence employed nearly 9,100 technicians.

The 12-percent increase in R&D technicians reversed a decline which began in 1967 and averaged 8 percent per year. This increase brought the total to just above the 1973 level.



Field of Employment

Engineering technicians accounted for 71 percent of all technicians working in FFRDC's in 1975. Physical science technicians, with 13 percent of the total, made up the second largest group, followed by mathematics technicians with 9 percent. Together, these three fields comprised 93 percent of all technicians employed in FFRDC's.

From 1974-75 engineering technicians increased at a slightly higher rate than all technicians, nearly 14 percent vs. 12 percent. The growth rate was slowest in the physical sciences, less than 1 percent, and among medical and health-related technicians, 3 percent.

APPENDIXES

A. Technical Notes

B. Detailed Statistical Tables

C. Reproduction of Covering Letter, Questionnaire, and Instructions

Note

The detailed statistical tables for this volume have been published separately under one cover. Included on pp. 36-42 in this volume are appendix B summary tables 3, 28, 29, 51, and 58, as well as a complete listing of all tables. Detailed statistical tables may be obtained gratis from the National Science Foundation, Washington, D.C. 20550.

APPENDIX A

Technical Notes

Scope of Survey

Survey questionnaires were mailed out in January 1975 to more than 2,200 academic institutions and 21 university-administered FFRDC's. The survey universe included all institutions of higher education, including 2-year institutions, believed to offer degree-credit courses in the sciences or engineering. The survey did not include such institutions as schools of art, music, law, theology and other specialized institutions without programs in the sciences or engineering.

During the course of the survey there was a net reduction of 9 institutions in the universe. The decrease was attributable to school closings and the inclusion of some nonapplicable institutions in the original mailout. Of the 2,230 institutions in the final survey universe at closeout on July 25, 1975, 1,818, or 82 percent, had responded. The overwhelming majority of the nonrespondents were small institutions. Among the 293 doctorate-granting institutions, which account for approximately two-thirds of all academic scientists and engineers, the number of respondents was 278, or 95 percent of the total.

Estimates for Nonresponse

In order to derive universe estimates of all employment data presented in this report, estimates were made for institutions that failed to respond to the survey. Imputed data for individual institutions were based primarily on key item totals reported (or estimated) in earlier surveys. Totals for these institutions were inflated or deflated according to overall rates of fluctuations for institutions at the same degree level and under the same type of control (public or private). Detailed imputations were then made on the basis of distributions computed for similar institutions. Tables A-1 to A-4 show rates of imputation for major items. The total imputed amount for full-time scientists and engineers, for example, was 20,200, or 8 percent of the total. The imputation rates are considerably higher, of course, for some totals that represent finer levels of detail, such as those by major field and level of institution.

Limitations of Data and Special Studies

Since the universe for the survey consisted of all institutions of higher education known or believed to have engaged in scientific or engineering activities, the data presented in this report are not subject to a sampling error. Some limitations must be taken into account, however, such as unevenness of response rate as mentioned above, some lack of agreement among respondents in interpreting survey definitions, and unavailability of complete survey data at some institutions.

In order to improve the quantity and quality of survey response the National Science Foundation conducts periodic evaluation studies of its survey programs for the purpose of (1) determining the statistical validity of the data, (2) identifying problem areas, and (3) developing methods to improve the accuracy of reporting, either through development of more uniform reporting procedures or through modification of the survey questions to bring them in line with data available in institutions' information systems.

The following represents a summary of identified problem areas and recommendations resulting from five recent activities involving various aspects of the Survey of Scientific Activities of Institutions of Higher Education. The activities included: (1) A pilot post-enumeration study conducted by Columbia Research Associates; (2) A study of data needs vs. data availability by the National Center for Higher Education Management Systems; (3) A study by Dr. Robert R. Wright on special assignment to NSF from the State University of New York involving visits to approximately 50 campuses and in-depth interviews with various academic officials responsible for responding to the survey; (4) Sponsorship of a national conference in which representatives from approximately two dozen universities were invited to discuss methods to alleviate reporting difficulties; and (5) Provision of support for a task force, representing a broad cross section of institutions comprising the Association of American Medical Colleges (AAMC) to study the feasibility of using data from AAMC's Faculty Roster file in the preparation of medical school responses to NSF's employment survey.

Specific Problem Areas

(1) Underreporting of scientists and engineers

The studies revealed that since an institution's survey response is usually aggregated from data compiled on the various academic departments of the institution, scientists and engineers employed in nonacademic departments of some institutions were not being reported; also postdoctorals not carried on an institution's payroll frequently were omitted. These omissions are considered to be relatively minor, however, in terms of total employment of scientists and engineers.

(2) Difficulty in reporting the teaching/R&D classification

Because of the close relationship between the teaching and research functions at universities, some graduate institutions have difficulty in reporting individuals in terms of "teaching" vs. "R&D" efforts. Moreover, when determining whether an individual is primarily employed in R&D activities, most institutions do not take into account the time spent on departmental research. Very few respondents keep records on departmental research involvement since it is considered to be part of the instructional programs of the institutions.

(3) Reporting by department rather than field

The survey requests data on field in which employed. Since institutions are organized along departmental lines, individuals are frequently reported according to the department in which they are assigned rather than the field in which they are actually employed. Moreover, in the case of a joint appointment, departmental reporting sometimes results in the misclassification of an individual as a "part-time" employee.

(4) Highest earned degree reporting not current

Many institutions do not maintain records of highest earned degrees of their personnel. In some cases the reported data represent the degree status at the time the employees joined the institution. In other cases the degree status reported is determined on the basis of the title held by the personnel.

(5) Inclusion of practitioners as medical scientists

Survey instructions call for the exclusion of medical scientists engaged primarily in patient care. It is recognized that the proportion of time spent in patient care versus teaching or research is not easily determined since frequently the functions are intertwined. Therefore, there is a problem of consistency among institutions in the way they determine which individuals are primarily involved in patient care.

Actions and Recommendations to Improve Data Quality and Timeliness

The problem areas mentioned in the previous section will be alleviated through current and future implementation of the following measures:

(1) Periodic evaluation of survey activities. These include interviews with data providers and data users, reliability and validity (R&V) studies in which an attempt is made to replicate an institution's survey response from source documents independent of the original response. Also included are consultations with academic organization such as the Association of American Medical Colleges (AAMC), the National Association of College and University Business Officers (NACUBO), the National Center for Higher Education Management Systems, (NCHEMS), the Association for Institutional Research (AIR), and individual academic institutions to discuss problem areas and develop proposals that will bring survey data requirements in line with data availability. This in turn might result in substantial modification of the questionnaire including redesign of some survey items and elimination of a particular survey item (such as the deletion of the graduate student item from future surveys).

(2) Clarification and updating of survey reporting instructions and definitions to achieve uniform interpretation of survey elements that previously were not clearly specified in the instructions sheet sent to participating institutions.

(3) Strengthening of ties with academic organizations through participation in meetings and conferences of national professional societies and collaboration on special data collection efforts, such as the collection of data on full-time scientists and engineers by field and sex for AIR.

(4) Various other measures recently adopted to speed survey response and ease the reporting burden on institutions. These include:

(a) Sending the questionnaire directly to the last respondent;

(b) Providing the name of an individual to be contacted for an immediate answer to any question that may arise in filling out the questionnaire;

(c) Study of the feasibility of assisting institutional respondents responsible for providing medical school data by using other information sources as benchmarks such as AAMC's Faculty Roster file;

(d) More extensive contact with respondents through visits, telephone followups, special survey conferences, and professional meetings;

(e) Consultation with institutions prior to implementing any significant change in the survey;

(f) Provision of a check list at the end of the form to help institutions avoid the most frequent kinds of reporting errors;

(g) Testing the use of a departmental data worksheet in compiling an institution's response.

A Typical Survey Cycle

The elapsed time from the date of mailout of the 1975 survey questionnaires to the release of final tabulations was approximately 10 months. As in previous years, responses were accepted for a period covering approximately 6 months from the date of initial mailout. During this period the major tasks consisted of (1) editing the forms, (2) following-up for nonresponse, which involved letters to nonrespondents as well as several hundred telephone calls, and (3) estimating for nonresponding institutions.

Note in the accompanying response analysis chart that of a total response rate of 82 percent, 69 percent had responded within 3 months of initial mailout. The remaining 13 percent took up to an additional 3 months to send in their responses. The survey was not closed out sooner because of the importance of achieving maximum response (90 percent-100 percent) from doctorate-granting institutions, which account for two-thirds of all scientists and engineers employed by academic institutions. Since the doctorate-granting institutions, in general, are large institutions, many of which must compile the survey data from individual departments, they necessarily lag smaller institutions in their rate of response. During the initial 3 months of the survey, the doctorate-granting institutions had a 59-percent response rate compared to 70 percent for other institutions. Over the next 3 months, however, with intensive followup on the part of NSF staff, the response rate for doctorate-granting institutions increased to 95 percent, compared to 80 percent for all other institutions.

The Foundation is continuing its efforts to assure future high response rates and improved data quality by (1) building on the excellent cooperation received from the great majority of institutions; (2) explaining the cooperative efforts between the Foundation and academic representatives that are being made to improve the survey design; and (3) providing respondents with feedback in the form of timely reports on the survey findings, as was done following the 1974 and 1975 employment surveys.

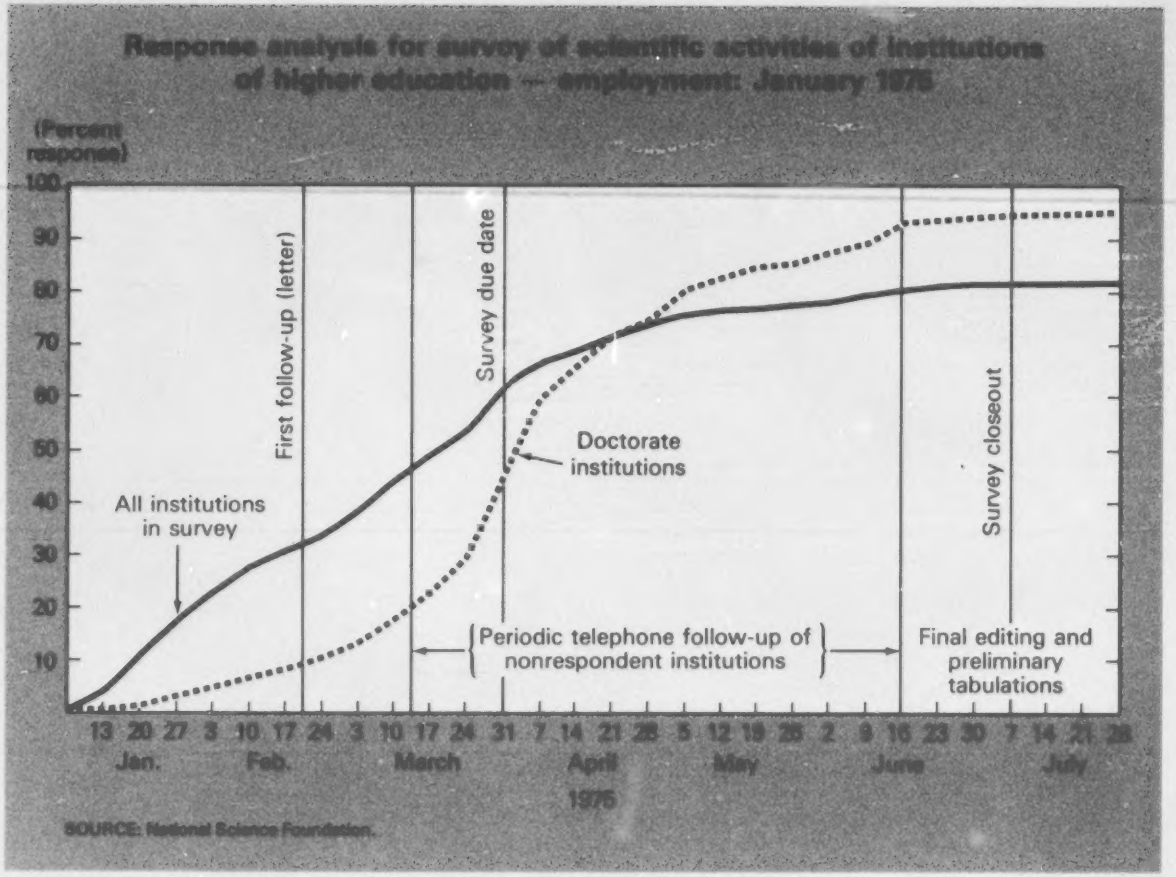


Table A-1.—Level of estimation of full-time scientists and engineers employed at universities and colleges, by function, major field, highest earned degree, and type of institution: January 1975

Item	All institutions		Institutions granting: Doctorate in S/E		Master's in S/E		Bachelor's in S/E		Degree other than in S/E		2-year institutions	
	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent
Total	20,224	8.5	5,501	3.6	2,144	7.0	5,032	19.5	339	35.6	7,208	26.8
By function:												
Teaching	18,536	10.2	4,056	4.1	2,062	7.0	5,093	20.4	334	36.0	6,991	26.8
R&D	2,823	6.5	2,671	6.3	35	6.0	89	25.8	0	0.0	28	31.1
Other	818	5.6	469	3.7	47	7.1	100	21.7	5	22.7	197	29.9
By major field:												
Engineers	1,608	7.2	465	2.8	118	7.0	268	19.7	1	12.5	756	26.8
Physical scientists	2,497	9.3	437	2.9	292	7.2	800	19.2	46	41.4	922	26.0
Environmental scientists	513	7.6	131	3.0	78	6.9	132	20.8	14	40.0	158	26.1
Mathematical scientists	2,553	11.3	286	2.9	292	7.0	689	19.4	46	34.1	1,240	26.1
Life scientists	5,828	6.3	3,114	4.0	324	6.8	800	19.9	58	34.1	1,532	25.7
Psychologists	1,689	10.5	252	3.5	254	6.8	497	19.3	54	38.6	632	25.9
Social scientists	5,205	10.0	703	2.9	786	7.1	1,846	19.5	120	34.1	1,750	26.0
Highest earned degree:												
Ph.D., Sc.D.	15,829	12.0	10,016	11.0	1,578	7.5	3,080	19.9	185	38.0	970	28.7
M.D., D.D.S., D.V.M., etc.	3,097	10.5	2,914	10.1	15	8.5	71	26.4	4	21.1	93	29.7
Master's	11,449	19.2	2,347	11.0	745	8.6	2,009	22.1	168	40.8	6,180	30.7
Bachelor's	2,862	15.8	1,689	12.6	53	7.5	212	22.3	10	30.3	898	29.5

Source: National Science Foundation

Table A-2.—Level of estimation of part-time scientists and engineers employed at universities and colleges, by function, major field, highest earned degree, and type of institution: January 1975

Item	All institutions		Institutions granting: Doctorate in S/E		Master's in S/E		Bachelor's in S/E		Degree other than in S/E		2-year institutions	
	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent
Total	5,864	10.1	1,394	4.2	231	3.4	1,086	21.1	83	15.0	3,070	25.8
By function:												
Teaching	6,021	12.0	1,593	6.1	226	3.4	1,055	21.2	83	15.0	3,064	25.8
R&D	649	10.1	632	10.1	5	7.5	12	21.1	0	0.0	0	0.0
Other	153	11.5	123	10.9	2	3.1	22	20.8	0	0.0	6	19.4
By major field:												
Engineers	569	11.0	111	3.8	22	4.3	40	18.3	0	0.0	396	25.9
Physical scientists	458	11.1	67	3.6	23	3.2	89	17.8	4	11.8	275	26.8
Environmental scientists	98	9.5	22	4.1	6	3.6	22	18.2	2	10.5	46	23.6
Mathematical scientists	1,022	17.3	144	8.3	28	3.1	113	18.3	11	17.2	726	27.8
Life scientists	1,430	6.1	639	3.2	36	3.9	314	33.8	33	16.5	408	26.9
Psychologists	709	12.7	106	5.1	34	2.8	141	19.1	9	15.3	419	27.8
Social scientists	1,533	12.2	143	3.2	73	3.0	367	18.2	22	12.9	928	26.5
Highest earned degree:												
Ph.D., Sc.D.	2,810	19.4	2,005	21.8	120	5.3	295	19.9	35	13.5	355	28.4
M.D., D.D.S., D.V.M., etc.	2,225	14.6	1,924	13.2	5	5.5	226	54.3	17	21.5	53	31.2
Master's	4,339	20.7	1,174	17.6	195	5.8	552	20.2	25	13.7	2,393	29.8
Bachelor's	1,807	24.9	758	24.2	72	6.3	95	18.5	6	18.2	876	35.9

Source: National Science Foundation

Table A-3.—Level of estimation of graduate students employed as scientists and engineers at universities and colleges, by function, major field, highest earned degree, and type of institution: January 1975

Item	All institutions		Institutions granting: Doctorate in S/E		Master's in S/E		Bachelor's in S/E		Degree other than in S/E		2-year institutions	
	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent
Total	2,166	2.2	1,858	2.0	308	5.9	0	0.0	0	0.0	0	0.0
By function:												
Teaching	4,846	8.7	4,602	8.9	244	6.0	0	0.0	0	0.0	0	0.0
R&D	3,126	8.0	3,090	8.0	36	6.5	0	0.0	0	0.0	0	0.0
Other	270	6.3	242	6.6	28	4.7	0	0.0	0	0.0	0	0.0
By major field:												
Engineers	939	6.0	926	6.0	13	6.4	0	0.0	0	0.0	0	0.0
Physical scientists	910	5.1	850	5.0	60	6.8	0	0.0	0	0.0	0	0.0
Environmental scientists	174	3.2	163	3.2	11	5.1	0	0.0	0	0.0	0	0.0
Mathematical scientists	473	5.4	440	5.4	33	5.4	0	0.0	0	0.0	0	0.0
Life scientists	1,017	3.8	944	3.7	73	5.4	0	0.0	0	0.0	0	0.0
Psychologists	361	4.5	300	4.2	61	7.2	0	0.0	0	0.0	0	0.0
Social scientists	634	3.7	577	3.6	57	5.0	0	0.0	0	0.0	0	0.0

Source: National Science Foundation

Table A-4.—Level of estimation of technicians employed in the sciences and engineering at universities and colleges, by function, major field, highest earned degree, and type of institution: January 1975

Item	All institutions		Institution granting: Doctorate in S/E		Master's in S/E		Bachelor's in S/E		Degree other than in S/E		2-year institution	
	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent	Amount imputed	Percent
Total	5,188	9.1	4,320	8.3	169	9.0	222	18.0	2	8.0	475	24.0
By function:												
R&D	4,901	13.6	4,777	13.6	40	8.8	50	18.7	2	66.7	32	23.9
Other	3,205	15.3	2,137	12.8	214	15.0	219	22.7	0	0.0	635	34.4
By major field:												
Engineering technicians	691	12.7	499	11.3	30	10.2	48	20.0	2	66.7	112	23.2
Physical science technicians	581	11.9	430	11.0	37	8.7	48	18.2	0	0.0	66	23.9
Environmental science technicians	147	10.1	135	10.1	4	5.9	4	12.9	0	0.0	4	16.7
Mathematical technicians	485	12.4	272	10.2	37	8.9	49	17.2	0	0.0	127	23.7
Biological and agricultural science technicians	1,984	11.9	1,803	11.6	39	9.0	45	17.4	0	0.0	97	25.9
Medical and health related technicians	2,927	13.0	2,845	12.9	9	8.7	16	24.6	0	0.0	57	22.8
Psychology technicians	110	10.7	91	10.4	8	7.9	6	15.0	0	0.0	5	27.8
Social science technicians	159	12.7	137	12.1	5	10.6	11	22.4	0	0.0	6	27.3

Source: National Science Foundation

Appendix B

A Listing of Detailed Statistical Tables

(Only summary tables B-3, B-28, B-29, B-51, and B-58 appear in this volume.)

NOTE: Tables B-1, B-11, B-19, B-21, B-23, B-32, B-34, B-36, and B-38 combine full-time and part-time scientists and engineers.

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Federally Funded Research and Development Centers (FFRDC's) (Administered by Universities and Colleges)

B-58. Summary data for 21 FFRDC's: January 1975 ..

Table B-3. Number of scientists and engineers employed in universities and colleges, by type of institution and employment status: January 1965-75

Type of institution and employment status	1965	1967	1969	1971	1973	1974	1975
Total	178,904	212,855	246,183	273,775	281,516	286,098	297,193
Full time	142,713	170,557	199,630	223,055	230,810	233,270	239,212
Part time	36,191	42,298	46,553	50,720	50,706	52,828	57,981
Doctorate in science and engineering	118,233	142,676	159,007	176,372	180,298	182,288	188,484
Full time	94,570	114,446	128,672	144,946	148,619	150,471	154,922
Part time	23,663	28,230	30,335	31,426	31,679	31,817	33,562
Master's in science and engineering	21,078	24,729	33,211	33,897	32,160	33,084	37,510
Full time	17,434	20,748	28,595	28,991	27,976	27,964	30,675
Part time	3,644	3,981	4,616	4,906	4,184	5,120	6,835
Bachelor's in science and engineering	22,423	23,025	24,808	26,665	32,298	32,929	30,923
Full time	18,673	19,328	20,731	22,732	27,051	27,275	25,784
Part time	3,750	3,697	4,077	3,933	5,247	5,654	5,139
No science degree 1/	17,170	22,425	29,157	36,843	36,760	37,797	40,276
Full time	12,036	16,035	21,632	26,386	27,164	27,560	27,831
Part time	5,134	6,390	7,525	10,455	9,596	10,237	12,445

1/ Includes two-year institutions as well as institutions awarding degrees in non-science fields.
SOURCE: NATIONAL SCIENCE FOUNDATION

Table B-28. DISTRIBUTION OF FULL-TIME SCIENTISTS AND ENGINEERS AT 50 LEADING PUBLIC UNIVERSITIES IN EMPLOYMENT OF SCIENTISTS AND ENGINEERS, BY EMPLOYMENT CATEGORY AND SEX: JANUARY 1973

	TOTAL, ALL CATEGORIES		ENGINEERING		PHYSICAL SCIENCES		ENVIRONMENTAL SCIENCES		MATHEMATICAL SCIENCES		LIFE SCIENCES		PSYCHOLOGY		SOCIAL SCIENCES	
	GRAND TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN
TOTAL, ALL PUBLIC INSTITUTIONS	157704	25438	16424	229	17619	1212	5315	239	16681	2164	63792	13465	11394	2941	36479	5588
1 UNIVERSITY OF MICHIGAN	3293	774	348	21	263	36	82	2	123	12	1889	561	154	45	434	97
2 UNIVERSITY OF MINNESOTA	2782	438	184	1	163	8	61	3	130	10	1551	281	121	20	566	115
3 UNIV OF WISCONSIN-MADISON	2729	502	239	17	262	14	130	15	111	3	1340	336	213	71	434	106
4 OHIO STATE UNIVERSITY	2369	485	263	4	157	5	53	1	100	6	1454	426	48	2	294	38
5 TEXAS A & M UNIVERSITY	2324	474	349	6	96	1	67	3	61	5	1379	410	29	8	343	41
6 UNIVERSITY OF WASHINGTON	2095	555	176	3	109	6	100	8	65	2	1396	513	38	6	151	17
7 UNIV ILLINOIS URBANA	2037	319	354	7	210	11	36	2	200	25	915	244	69	12	233	18
8 UNIVERSITY OF FLORIDA	1963	162	183	2	149	2	34	0	91	7	1123	90	65	12	298	49
9 PENNSYLVANIA STATE UNIV	1930	148	443	5	204	10	90	2	174	19	684	70	82	18	253	24
10 UNIV OF TEXAS AT AUSTIN	1743	353	270	30	405	30	116	19	145	21	242	94	145	44	420	115
TOTAL 1ST 10 INSTS.	23265	4270	2809	96	2018	123	829	55	1206	110	11973	3025	1004	241	3426	620
11 UNIVERSITY OF PITTSBURGH	1603	451	123	2	126	6	17	0	112	21	878	330	113	49	234	43
12 PURDUE UNIV ALL CAMPUSES	1582	150	330	4	186	6	24	1	159	14	572	86	60	10	245	29
13 MICHIGAN STATE UNIVERSITY	1574	189	118	0	173	5	35	0	130	11	703	113	114	21	301	39
14 UNIV OF NC AT CHAPEL HILL	1567	279	0	0	98	2	39	5	60	1	1061	214	57	12	252	45
15 U OF CAL LOS ANGELES	1512	185	150	3	155	7	52	3	71	4	744	129	67	11	273	28
16 RUTGERS THE STATE UNIV	1461	275	91	0	144	13	65	6	152	30	415	74	140	31	484	121
17 UNIV OF MD COLLEGE PARK	1409	219	157	2	281	8	16	1	131	12	456	126	227	32	241	38
18 U OF CAL BERKELEY	1402	159	281	5	187	14	20	0	79	4	474	80	40	11	313	45
19 WAYNE STATE UNIVERSITY 1/	1382	252	82	1	94	7	9	0	73	4	894	188	48	6	182	46
20 UNIV OF MISSOURI COLUMBIA	1245	69	120	0	72	0	18	1	48	0	743	38	44	6	195	22
TOTAL 1ST 20 INSTS.	38002	6498	4261	113	3534	191	1124	72	2221	211	18918	4403	1790	432	6146	1076
21 UNIVERSITY OF ARIZONA	1208	97	122	2	184	11	73	2	108	14	490	43	57	13	174	12
22 LA ST U BATON ROUGE	1189	256	103	0	78	1	47	4	75	10	742	214	22	4	122	23
23 UNIVERSITY OF IOWA	1180	148	64	1	74	0	13	0	59	4	771	124	34	4	174	15
24 UNIVERSITY OF KANSAS	1180	224	79	0	83	0	49	5	65	6	569	134	92	22	223	57
25 UNIVERSITY OF COLORADO	1124	114	127	1	176	3	23	0	72	7	496	78	65	7	165	18
26 U OF CAL DAVIS	1114	88	76	1	73	0	32	0	31	1	698	58	16	0	188	28
27 IOWA ST U OF SCI & TECH	1113	103	305	3	83	3	40	0	86	5	395	42	25	4	179	46
28 TEMPLE UNIVERSITY	1104	193	27	0	68	4	0	0	71	6	620	124	127	29	201	30
29 UNIVERSITY OF GEORGIA	1035	77	29	0	86	6	37	3	62	5	545	41	93	13	186	9
30 UNIV OF HAWAII AT MANOA	972	132	87	2	67	3	74	2	41	3	409	81	45	6	249	35
TOTAL 1ST 30 INSTS.	49227	7930	5275	123	4506	222	1512	88	2891	272	24673	5342	2303	554	8007	1349
31 OREGON STATE UNIVERSITY	962	88	118	1	88	4	98	3	73	4	437	54	18	6	130	16
32 WEST VIRGINIA UNIVERSITY	959	96	123	4	38	1	14	0	43	10	614	68	30	7	91	6
33 UNIVERSITY OF ARKANSAS	953	203	91	0	49	2	11	1	24	4	620	164	18	3	140	29
34 UNIVERSITY OF CONNECTICUT	945	102	82	1	73	4	35	4	44	4	492	145	63	12	156	12
35 UNIV OF KENTUCKY ALL CAM	907	52	89	0	40	1	12	1	66	4	525	42	37	2	138	4
36 U OF CAL SAN DIEGO	903	79	41	0	181	6	94	6	37	4	443	51	21	3	83	11
37 SUNY BUFFALO	898	93	91	1	113	5	14	0	121	1	325	40	66	9	156	24
38 GEORGIA INSTITUTE OF TECH	847	35	484	8	134	2	11	0	79	4	18	4	13	2	128	13
39 COLORADO STATE UNIVERSITY	843	43	145	2	50	1	27	1	68	3	425	25	24	2	104	9
40 UNIV OF NEBRASKA - LNCLN	825	103	125	0	78	1	12	0	47	3	457	93	26	1	86	5
TOTAL 1ST 40 INSTS.	58206	8909	6644	140	5350	249	1843	104	3503	329	29029	6028	2684	632	9219	1478
41 UNIV OF MASS AT AMHERST	815	98	125	0	105	5	33	2	86	9	228	50	52	11	186	21
42 KANSAS ST UNIVERSITY	806	121	99	2	57	1	17	0	45	3	474	107	14	4	100	7
43 UNIVERSITY OF CINCINNATI	799	108	102	2	49	2	16	1	35	3	489	91	29	1	79	8
44 U OF CAL SAN FRANCISCO	798	160	0	0	0	0	0	0	3	0	794	159	1	1	0	0
45 OKLAHOMA STATE UNIVERSITY	759	26	137	0	50	4	8	0	36	2	385	14	37	5	104	2
46 VIRGINIA COMMONWLTH UNIV	738	117	0	0	17	0	0	0	32	2	527	83	24	2	138	30
47 U OF ILL MEDICAL CENTER	733	211	0	0	17	2	0	0	0	0	703	200	13	3	0	0
48 UNIV ALABAMA BIRMINGHAM	715	122	20	0	26	2	2	0	42	9	565	103	17	4	43	4
49 U TENNESSEE KNOXVILLE	689	119	144	1	84	5	24	0	63	7	140	60	50	7	184	39
50 SUNY STONY BROOK	686	89	43	1	96	3	25	0	71	3	260	48	49	11	144	23
TOTAL 1ST 50 INSTS.	69106	10082	7314	146	5891	273	1965	107	3918	367	33594	6949	2967	628	10197	1612
TOTAL ALL OTHER INSTS.	10 98	15356	9110	83	11768	939	3350	132	12763	1797	30198	6516	8427	1913	26282	3976

NOTE: TABLE DOES NOT INCLUDE ANY LEADING INSTITUTION THAT (1) REQUIRED NATIONAL SCIENCE FOUNDATION ESTIMATES, OR (2) REQUESTED THAT ITS DATA BE HELD CONFIDENTIAL.

1/ DATA ARE APPROXIMATE.

SOURCE: NATIONAL SCIENCE FOUNDATION

Table B-29. DISTRIBUTION OF FULL-TIME SCIENTISTS AND ENGINEERS AT 50 LEADING PRIVATE UNIVERSITIES IN EMPLOYMENT OF SCIENTISTS AND ENGINEERS, BY EMPLOYMENT CATEGORY AND SEX: JANUARY 1975

	TOTAL, ALL CATEGORIES		ENGINEERING		PHYSICAL SCIENCES		ENVIRONMENTAL SCIENCES		MATHEMATICAL SCIENCES		LIFE SCIENCES		PSYCHOLOGY		SOCIAL SCIENCES	
	GRAND TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN	TOTAL	WOMEN
TOTAL, ALL PRIVATE INSTITUTIONS	71508	11212	6054	142	9214	791	1407	81	5843	764	28627	5799	4731	1075	15572	2560
1 HARVARD UNIVERSITY	2404	374	43	1	241	17	16	0	41	4	2343	325	51	9	174	18
2 JOHNS HOPKINS UNIVERSITY	1889	263	55	1	95	6	31	1	55	8	1500	219	30	8	123	20
3 MASS INST OF TECHNOLOGY	1711	227	766	61	290	23	80	15	131	13	239	91	23	6	182	18
4 CORNELL UNIVERSITY	1709	208	246	6	149	8	44	1	42	0	868	113	28	7	332	73
5 YALE UNIVERSITY	1677	480	53	0	137	11	37	3	44	1	1191	418	49	24	166	23
6 STANFORD UNIVERSITY	1660	282	210	5	153	6	36	1	70	4	1026	233	31	10	134	23
7 WASHINGTON UNIV ST LOUIS	1608	264	72	1	54	4	11	3	27	0	1321	237	25	3	98	16
8 NEW YORK UNIVERSITY	1377	279	9	1	102	3	1	0	95	5	844	225	79	20	247	25
9 COLUMBIA UNIV MAIN DIV	1343	236	105	3	149	6	87	3	35	2	771	200	33	8	163	14
10 CASE WESTERN RESERVE UNIV	1306	190	112	2	92	4	12	0	34	4	946	165	30	3	71	12
TOTAL 1ST 10 INSTS.	17191	2803	1671	81	1462	88	355	27	579	41	11049	2226	385	96	1690	242
11 UNIV OF PENNSYLVANIA	1298	208	96	5	99	2	6	0	54	7	834	162	25	0	184	26
12 UNIVERSITY OF CHICAGO	1273	202	33	0	170	8	41	2	66	1	752	152	50	14	161	25
13 UNIV OF STHRN CALIFORNIA	1232	174	132	3	70	5	21	2	64	2	777	143	37	5	131	14
14 DUKE UNIVERSITY	1210	203	42	0	64	2	14	2	32	5	890	175	30	4	138	15
15 NORTHWESTERN UNIVERSITY	942	80	128	3	104	4	14	0	69	4	431	50	16	3	180	16
16 UNIVERSITY OF ROCHESTER	860	74	41	0	134	2	11	0	51	1	441	50	72	15	110	6
17 BOSTON UNIVERSITY	692	120	15	0	70	6	5	0	20	1	428	76	59	18	95	19
18 PRINCETON UNIVERSITY	667	70	154	12	161	5	27	4	74	6	90	22	36	4	125	16
19 CALIFORNIA INST OF TECH	662	63	128	2	275	26	69	3	52	5	107	26	2	0	29	1
20 GEORGE WASHINGTON UNIV	655	107	54	0	28	1	6	0	84	5	319	55	39	13	125	33
TOTAL 1ST 20 INSTS.	26082	4104	2494	106	2637	150	569	40	1145	78	16118	3137	751	180	2968	413
21 BAYLOR COLLEGE OF MED	655	211	16	0	12	2	1	0	11	1	592	198	15	5	8	5
22 VANDERBILT UNIVERSITY	653	93	48	0	65	4	0	0	40	3	392	73	49	2	79	11
23 UNIVERSITY OF MIAMI	631	105	60	0	52	1	86	4	1	0	263	48	67	20	102	26
24 HOWARD UNIVERSITY	573	90	49	2	39	4	0	0	27	5	360	53	14	2	84	24
25 YESHIVA UNIVERSITY	500	128	0	0	38	0	0	0	16	1	379	95	32	24	35	8
26 TULANE UNIVERSITY	468	83	37	0	31	3	6	1	30	1	285	66	19	5	60	7
27 CARNEGIE-MELLON UNIV	467	31	145	2	135	5	0	0	57	4	35	10	28	2	67	8
28 GEORGETOWN UNIVERSITY	445	84	0	0	24	1	0	0	13	0	320	71	10	1	78	11
29 LOMA LINDA UNIVERSITY	432	111	8	0	67	18	0	0	19	4	285	81	16	3	37	5
30 ST LOUIS UNIV	424	74	2	0	20	0	13	0	11	2	321	66	16	2	41	4
TOTAL 1ST 30 INSTS.	31930	5114	2859	110	3120	186	875	48	1370	99	19350	3898	997	252	3559	522
31 BRIGHAM YOUNG UNIVERSITY	398	10	47	0	58	0	11	0	53	2	81	4	45	3	103	1
32 NORTHEASTERN UNIVERSITY	394	47	108	0	76	4	11	0	43	4	55	15	27	6	74	18
33 SYRACUSE UNIVERSITY	361	20	80	1	53	2	8	0	43	3	37	4	28	0	112	10
34 BRAWN UNIVERSITY	360	34	45	1	62	3	19	0	53	1	69	12	21	4	91	13
35 WAKE FOREST UNIVERSITY	342	28	6	0	17	0	0	0	12	0	239	18	24	0	44	4
36 ROCKEFELLER UNIVERSITY	337	35	3	0	32	1	0	0	16	0	237	21	49	13	0	0
37 THE MED COLL OF WISCONSIN	321	36	0	0	0	0	0	0	0	0	321	36	0	0	0	0
38 RICE UNIVERSITY	318	18	83	3	100	2	12	0	26	2	37	7	9	2	51	2
39 BRANDEIS UNIVERSITY	317	40	0	0	79	5	0	0	26	1	114	17	15	4	83	13
40 UNIVERSITY OF NOTRE DAME	317	10	64	0	70	0	6	0	36	1	41	3	13	2	87	4
TOTAL 1ST 40 INSTS.	35395	5392	3295	115	3667	205	942	48	1678	113	20581	4035	1228	292	4204	587
41 LOYOLA UNIVERSITY	310	49	0	0	18	0	0	0	15	1	166	27	32	5	79	16
42 DARTMOUTH COLLEGE	302	26	25	0	32	0	8	0	26	3	117	15	20	5	68	3
43 RENSSELAER POLY INST	288	4	118	0	88	1	8	0	31	1	14	2	8	0	21	0
44 LEHIGH UNIVERSITY	285	7	114	2	42	1	12	0	41	1	10	0	11	1	55	2
45 UNIVERSITY OF DENVER	280	34	69	2	57	4	4	0	25	0	11	2	23	5	91	21
46 FAIRLEIGH DICKINSON UNIV	268	45	24	1	40	4	2	0	22	3	71	15	37	11	72	11
47 LONG ISLAND UNIVERSITY	266	32	0	0	42	2	15	3	28	3	43	4	41	6	91	14
48 CREIGHTON UNIVERSITY	262	45	0	0	14	1	0	0	6	1	212	41	8	1	22	1
49 UNIVERSITY OF DAYTON	251	18	86	2	53	1	3	1	31	3	19	3	16	3	43	5
50 THOM JEFFERSON UNIV HOSP	247	41	0	0	4	1	0	0	0	0	243	40	0	0	0	0
TOTAL 1ST 50 INSTS.	38454	5693	3737	122	4057	220	794	49	1903	129	21487	4184	1430	329	4746	660
TOTAL ALL OTHER INSTS.	33054	5519	2317	20	5157	571	673	32	3940	635	7140	1615	3301	746	10826	1900

NOTE: TABLE DOES NOT INCLUDE ANY LEADING INSTITUTION THAT (1) REQUIRED NATIONAL SCIENCE FOUNDATION ESTIMATES, OR (2) REQUESTED THAT ITS DATA BE HELD CONFIDENTIAL.

SOURCE: NATIONAL SCIENCE FOUNDATION

Table B-51.

SUMMARY DATA FOR 2,209 UNIVERSITIES AND COLLEGES: JANUARY 1975

(SUMMARIZED FROM NSF SURVEY FORM 724 REPRODUCED IN APPENDIX C)

ITEM 1 - FULL-TIME S&E, BY FIELD AND FUNCTION IN WHICH PRIMARILY EMPLOYED; AND FTE, BY FUNCTION, 1975

FIELD OF EMPLOYMENT	TOTAL	TEACHING	R&D	OTHER S&E ACTIVITIES
A. ENGINEERS (TOTAL)	22478	17543	4047	888
(1) AERO. & ASTRO. ENGRS.	947	691	246	10
(2) CHEMICAL ENGINEERS	1590	1268	267	55
(3) CIVIL ENGINEERS	3794	3243	434	117
(4) ELECTRICAL ENGINEERS	5367	4295	910	162
(5) MECHANICAL ENGINEERS	4328	3681	530	117
(6) OTHER ENGINEERS	6452	4365	1660	427
B. PHYSICAL SCIENTISTS (TOTAL)	26833	20860	5507	466
(1) CHEMISTS	13943	11208	2472	263
(2) PHYSICISTS	10953	8589	2215	149
(3) OTHER PHYSICAL SCIENTISTS	1937	1063	820	54
C. ENVIRONMENTAL SCIENTISTS(TOTAL)	6782	4988	1649	145
(1) EARTH SCIENTISTS	5168	4254	805	109
(2) ATMOSPHERIC SCIENTISTS	564	323	222	19
(3) OCEANOGRAPHERS	1050	411	622	17
D. MATHEMATICAL SCIENTISTS (TOTAL)	22524	20406	1368	750
(1) MATHEMATICIANS	18747	17806	719	222
(2) COMPUTER SCIENTISTS	3777	2600	649	528
E. LIFE SCIENTISTS (TOTAL)	92419	56388	26347	9684
(1) AGRICULTURAL SCIENTISTS	13970	3873	3989	6108
(2) BIOLOGICAL SCIENTISTS	33291	23010	9470	821
(3) MEDICAL SCIENTISTS	45158	29515	12888	2755
F. PSYCHOLOGISTS (TOTAL)	16125	13783	1131	1211
G. SOCIAL SCIENTISTS (TOTAL)	52051	47556	3150	1345
(1) ECONOMISTS	10230	8691	1104	438
(2) SOCIOLOGISTS	10777	9974	588	214
(3) POLITICAL SCIENTISTS	8741	8177	372	192
(4) HISTORIANS	13572	13072	236	154
(5) OTHER SOCIAL SCIENTISTS	8731	7524	850	377
H. TOTAL (SUM OF A TO G)	239212	181524	43199	14489
I. FTE DISTRIBUTION	239212	173454	49094	16664

ITEM 2 - FULL-TIME S&E, BY HIGHEST DEGREE EARNED AND FUNCTION IN WHICH PRIMARILY EMPLOYED, 1975

HIGHEST EARNED DEGREE	TOTAL	TEACHING	R&D	OTHER S&E ACTIVITIES
A. PH.D. OR SC.D.	131890	103781	23839	4270
B. MD., DDS., DVM., ETC.	29604	20312	7337	1955
C. MASTER'S	59576	49979	5723	3874
D. BACHELOR'S OR EQUIVALENT	18142	7452	6300	4390
E. TOTAL (SUM A TO D)	239212	181524	43199	14489

ITEM 3 - PART-TIME S&E, BY FIELD AND FUNCTION IN WHICH PRIMARILY EMPLOYED; AND FTE, BY FUNCTION, 1975

FIELD OF EMPLOYMENT	TOTAL	TEACHING	R&D	OTHER S&E ACTIVITIES
A. ENGINEERS (TOTAL)	5184	4376	763	45
(1) AERO. & ASTRO. ENGRS.	152	112	38	2
(2) CHEMICAL ENGINEERS	252	191	59	2
(3) CIVIL ENGINEERS	1004	913	87	4
(4) ELECTRICAL ENGINEERS	1334	1182	144	8
(5) MECHANICAL ENGINEERS	930	827	99	4
(6) OTHER ENGINEERS	1512	1151	336	25
B. PHYSICAL SCIENTISTS (TOTAL)	4131	3337	749	45
(1) CHEMISTS	2310	1860	421	29
(2) PHYSICISTS	1358	1129	217	12
(3) OTHER PHYSICAL SCIENTISTS	463	348	111	4
C. ENVIRONMENTAL SCIENTISTS(TOTAL)	1035	792	230	13
(1) EARTH SCIENTISTS	804	674	123	7
(2) ATMOSPHERIC SCIENTISTS	113	66	44	3
(3) OCEANOGRAPHERS	118	52	63	3
D. MATHEMATICAL SCIENTISTS (TOTAL)	5921	5648	169	104
(1) MATHEMATICIANS	4556	4448	87	21
(2) COMPUTER SCIENTISTS	1365	1200	82	83
E. LIFE SCIENTISTS (TOTAL)	23505	19260	3516	729
(1) AGRICULTURAL SCIENTISTS	999	588	308	103
(2) BIOLOGICAL SCIENTISTS	4729	3603	1038	88
(3) MEDICAL SCIENTISTS	17777	15069	2170	538
F. PSYCHOLOGISTS (TOTAL)	5602	5041	325	236
G. SOCIAL SCIENTISTS (TOTAL)	12603	11796	654	153
(1) ECONOMISTS	2483	2306	132	45
(2) SOCIOLOGISTS	3426	3274	120	32
(3) POLITICAL SCIENTISTS	1864	1722	112	30
(4) HISTORIANS	2186	2128	36	22
(5) OTHER SOCIAL SCIENTISTS	2644	2366	254	24
H. TOTAL (SUM OF A TO G)	57981	50250	6406	1325
I. FTE DISTRIBUTION	21594	17502	3468	624

ITEM 4 - PART-TIME S&E, BY HIGHEST DEGREE EARNED AND FUNCTION IN WHICH PRIMARILY EMPLOYED, 1975

HIGHEST EARNED DEGREE	TOTAL	TEACHING	R&D	OTHER S&E ACTIVITIES
A. PH.D. OR SC.D.	14451	11516	2613	322
B. MD., DDS., DVM., ETC.	15292	13516	1312	464
C. MASTER'S	20969	19406	1219	344
D. BACHELOR'S OR EQUIVALENT	7269	5812	1262	195
E. TOTAL (SUM A TO D)	57981	50250	6406	1325

Table B-51.
Continued

ITEM 5 - S&E WITH DOCTORATE DEGREES, BY FIELD IN WHICH PRIMARILY EMPLOYED, 1975

FIELD OF EMPLOYMENT	TOTAL	FULL - TIME	PART - TIME
A. ENGINEERS	14669	13163	1506
B. PHYSICAL SCIENTISTS	21674	19882	1792
C. ENVIRONMENTAL SCIENTISTS	5018	4614	404
D. MATHEMATICAL SCIENTISTS	13110	12033	1077
E. LIFE SCIENTISTS	42116	38294	3822
F. PSYCHOLOGISTS	13647	11269	2378
G. SOCIAL SCIENTISTS	36107	32635	3472
H. TOTAL (SUM OF A TO G)	146341	131890	14451

ITEM 6 - FULL-TIME S&E, BY FIELD IN WHICH PRIMARILY EMPLOYED AND SEX, 1975

FIELD OF EMPLOYMENT	TOTAL	MEN	WOMEN
A. ENGINEERS (TOTAL)	22478	22107	371
(1) AERO. & ASTRO. ENGRS.	947	922	25
(2) CHEMICAL ENGINEERS	1590	1566	24
(3) CIVIL ENGINEERS	3794	3731	63
(4) ELECTRICAL ENGINEERS	5367	5310	57
(5) MECHANICAL ENGINEERS	4328	4298	30
(6) OTHER ENGINEERS	6452	6280	172
B. PHYSICAL SCIENTISTS (TOTAL)	26833	24830	2003
(1) CHEMISTS	13943	12509	1434
(2) PHYSICISTS	10953	10569	384
(3) OTHER PHYSICAL SCIENTISTS	1937	1752	185
C. ENVIRONMENTAL SCIENTISTS(TOTAL)	6782	6462	320
(1) EARTH SCIENTISTS	5168	4944	224
(2) ATMOSPHERIC SCIENTISTS	564	530	34
(3) OCEANOGRAPHERS	1050	988	62
D. MATHEMATICAL SCIENTISTS (TOTAL)	22524	19596	2928
(1) MATHEMATICIANS	18747	16275	2472
(2) COMPUTER SCIENTISTS	3777	3321	456
E. LIFE SCIENTISTS (TOTAL)	92419	73155	19264
(1) AGRICULTURAL SCIENTISTS	13970	11656	2314
(2) BIOLOGICAL SCIENTISTS	33291	26933	6358
(3) MEDICAL SCIENTISTS	45158	34566	10592
F. PSYCHOLOGISTS (TOTAL)	16125	12509	3616
G. SOCIAL SCIENTISTS (TOTAL)	52051	43903	8148
(1) ECONOMISTS	10230	9356	874
(2) SOCIOLOGISTS	10777	8147	2630
(3) POLITICAL SCIENTISTS	8741	7842	899
(4) HISTORIANS	13572	11804	1768
(5) OTHER SOCIAL SCIENTISTS	8731	6754	1977
H. TOTAL (SUM OF A TO G)	239212	202562	36650

ITEM 7 - GRADUATE STUDENTS RECEIVING COMPENSATION FOR PART-TIME SERVICES AS SCIENTISTS AND ENGINEERS, BY FIELD AND FUNCTION IN WHICH PRIMARILY ENGAGED; AND TOTAL FTE FUNCTION, 1975

FIELD OF EMPLOYMENT	TOTAL	TEACHING	R&D	OTHER S&E ACTIVITIES
A. ENGINEERS (TOTAL)	15524	5389	9585	550
(1) AERO. & ASTRO. ENGRS.	767	176	582	9
(2) CHEMICAL ENGINEERS	1645	582	974	89
(3) CIVIL ENGINEERS	2488	929	1443	116
(4) ELECTRICAL ENGINEERS	3578	1543	1961	74
(5) MECHANICAL ENGINEERS	2290	971	1238	81
(6) OTHER ENGINEERS	4756	1188	3387	181
B. PHYSICAL SCIENTISTS (TOTAL)	17771	10867	6423	481
(1) CHEMISTS	10177	6823	3041	313
(2) PHYSICISTS	6602	3646	2797	159
(3) OTHER PHYSICAL SCIENTISTS	992	398	585	9
C. ENVIRONMENTAL SCIENTISTS(TOTAL)	5369	2342	2823	195
(1) EARTH SCIENTISTS	3939	2051	1713	175
(2) ATMOSPHERIC SCIENTISTS	602	158	433	11
(3) OCEANOGRAPHERS	819	133	677	9
D. MATHEMATICAL SCIENTISTS (TOTAL)	8687	6988	1477	222
(1) MATHEMATICIANS	6966	6023	788	155
(2) COMPUTER SCIENTISTS	1721	965	689	67
E. LIFE SCIENTISTS (TOTAL)	26753	13570	11968	1215
(1) AGRICULTURAL SCIENTISTS	4871	1163	3560	146
(2) BIOLOGICAL SCIENTISTS	15644	9359	5835	450
(3) MEDICAL SCIENTISTS	6238	3048	2573	619
F. PSYCHOLOGISTS (TOTAL)	7991	5092	2213	686
G. SOCIAL SCIENTISTS (TOTAL)	17208	11591	4703	914
(1) ECONOMISTS	4209	2429	1672	108
(2) SOCIOLOGISTS	3035	2034	868	133
(3) POLITICAL SCIENTISTS	2662	1906	603	153
(4) HISTORIANS	3326	2745	386	195
(5) OTHER SOCIAL SCIENTISTS	3976	2477	1174	325
H. TOTAL (SUM OF A TO G)	99294	55839	39192	4263
I. FTE DISTRIBUTION	43662	23253	18393	2016

ITEM 8 - TECHNICIANS, BY FIELD AND FUNCTION IN WHICH PRIMARILY EMPLOYED, JANUARY 1975

FIELD OF EMPLOYMENT	TOTAL	R&D	OTHER ACTIVITIES
A. ENGINEERING TECHNICIANS	5441	3006	2435
B. PHYSICAL SCIENCE TECHS	4892	2767	2125
C. ENVIRONMENTAL SCIENCE TECHS	1461	1141	320
D. MATHEMATICS TECHNICIANS	3905	1237	2668
E. BIO. & AGR. SCIENCE TECHS	16697	13292	3365
F. MEDICAL & HEALTH-RELATED	22447	13244	9203
G. PSYCHOLOGY TECHNICIANS	1031	696	335
H. SOCIAL SCIENCE TECHS	1248	723	525
I. TOTAL (SUM OF A TO H)	57082	36106	20976

SOURCE: NATIONAL SCIENCE FOUNDATION

Table B-58.

SUMMARY DATA FOR 21 FFRDC'S: JANUARY 1975
(SUMMARIZED FROM NSF SURVEY FORM 724 REPRODUCED IN APPENDIX C)

ITEM 1 - FULL-TIME S&E, BY FIELD AND FUNCTION IN WHICH PRIMARILY EMPLOYED: AND FTE, BY FUNCTION, 1975

FIELD OF EMPLOYMENT	TOTAL	TEACHING	R&D	OTHER S&E ACTIVITIES
A. ENGINEERS (TOTAL)	5820	0	5763	57
(1) AERO. & ASTRO. ENGRS.	201	0	200	1
(2) CHEMICAL ENGINEERS	217	0	212	5
(3) CIVIL ENGINEERS	151	0	147	4
(4) ELECTRICAL ENGINEERS	2691	0	2675	16
(5) MECHANICAL ENGINEERS	1371	0	1359	12
(6) OTHER ENGINEERS	1189	0	1170	19
B. PHYSICAL SCIENTISTS (TOTAL)	4472	0	4445	27
(1) CHEMISTS	1247	0	1238	9
(2) PHYSICISTS	2884	0	2880	4
(3) OTHER PHYSICAL SCIENTISTS	341	0	327	14
C. ENVIRONMENTAL SCIENTISTS(TOTAL)	247	0	247	0
(1) EARTH SCIENTISTS	99	0	99	0
(2) ATMOSPHERIC SCIENTISTS	125	0	125	0
(3) OCEANOGRAPHERS	23	0	23	0
D. MATHEMATICAL SCIENTISTS (TOTAL)	1213	0	1209	4
(1) MATHEMATICIANS	725	0	721	4
(2) COMPUTER SCIENTISTS	488	0	488	0
E. LIFE SCIENTISTS (TOTAL)	476	0	472	4
(1) AGRICULTURAL SCIENTISTS	0	0	0	0
(2) BIOLOGICAL SCIENTISTS	389	0	386	3
(3) MEDICAL SCIENTISTS	87	0	86	1
F. PSYCHOLOGISTS (TOTAL)	9	0	8	1
G. SOCIAL SCIENTISTS (TOTAL)	133	0	130	3
(1) ECONOMISTS	35	0	34	1
(2) SOCIOLOGISTS	2	0	1	1
(3) POLITICAL SCIENTISTS	9	0	8	1
(4) HISTORIANS	3	0	3	0
(5) OTHER SOCIAL SCIENTISTS	84	0	84	0
H. TOTAL (SUM OF A TO G)	12370	0	12274	96
I. FTE DISTRIBUTION	12370	9	12265	96

ITEM 2 - FULL-TIME S&E, BY HIGHEST DEGREE EARNED AND FUNCTION IN WHICH PRIMARILY EMPLOYED, 1975

HIGHEST EARNED DEGREE	TOTAL	TEACHING	R&D	OTHER S&E ACTIVITIES
A. PH.D. OR SC.D.	4614	0	4593	21
B. MD., DDS., DVM., ETC.	39	0	38	1
C. MASTER'S	2987	0	2969	18
D. BACHELOR'S OR EQUIVALENT	4730	0	4674	56
E. TOTAL (SUM A TO D)	12370	0	12274	96

ITEM 3 - PART-TIME S&E, BY FIELD AND FUNCTION IN WHICH PRIMARILY EMPLOYED: AND FTE, BY FUNCTION, 1975

FIELD OF EMPLOYMENT	TOTAL	TEACHING	R&D	OTHER S&E ACTIVITIES
A. ENGINEERS (TOTAL)	22	0	22	0
(1) AERO. & ASTRO. ENGRS.	0	0	0	0
(2) CHEMICAL ENGINEERS	3	0	3	0
(3) CIVIL ENGINEERS	1	0	1	0
(4) ELECTRICAL ENGINEERS	11	0	11	0
(5) MECHANICAL ENGINEERS	5	0	5	0
(6) OTHER ENGINEERS	2	0	2	0
B. PHYSICAL SCIENTISTS (TOTAL)	88	1	87	0
(1) CHEMISTS	29	0	29	0
(2) PHYSICISTS	50	0	50	0
(3) OTHER PHYSICAL SCIENTISTS	9	1	8	0
C. ENVIRONMENTAL SCIENTISTS(TOTAL)	9	0	9	0
(1) EARTH SCIENTISTS	3	0	3	0
(2) ATMOSPHERIC SCIENTISTS	6	0	6	0
(3) OCEANOGRAPHERS	0	0	0	0
D. MATHEMATICAL SCIENTISTS (TOTAL)	27	0	27	0
(1) MATHEMATICIANS	15	0	15	0
(2) COMPUTER SCIENTISTS	12	0	12	0
E. LIFE SCIENTISTS (TOTAL)	24	0	24	0
(1) AGRICULTURAL SCIENTISTS	0	0	0	0
(2) BIOLOGICAL SCIENTISTS	20	0	20	0
(3) MEDICAL SCIENTISTS	4	0	4	0
F. PSYCHOLOGISTS (TOTAL)	1	0	0	1
G. SOCIAL SCIENTISTS (TOTAL)	5	0	5	0
(1) ECONOMISTS	4	0	4	0
(2) SOCIOLOGISTS	0	0	0	0
(3) POLITICAL SCIENTISTS	1	0	1	0
(4) HISTORIANS	0	0	0	0
(5) OTHER SOCIAL SCIENTISTS	0	0	0	0
H. TOTAL (SUM OF A TO G)	176	1	174	1
I. FTE DISTRIBUTION	101	1	100	0

ITEM 4 - PART-TIME S&E, BY HIGHEST DEGREE EARNED AND FUNCTION IN WHICH PRIMARILY EMPLOYED, 1975

HIGHEST EARNED DEGREE	TOTAL	TEACHING	R&D	OTHER S&E ACTIVITIES
A. PH.D. OR SC.D.	69	1	68	0
B. MD., DDS., DVM., ETC.	4	0	4	0
C. MASTER'S	50	0	49	1
D. BACHELOR'S OR EQUIVALENT	53	0	53	0
E. TOTAL (SUM A TO D)	176	1	174	1

Table B-58.
Continued

ITEM 5 - S&E WITH DOCTORATE DEGREES, BY FIELD IN WHICH PRIMARILY EMPLOYED, 1975

FIELD OF EMPLOYMENT	TOTAL	FULL - TIME	PART - TIME
A. ENGINEERS	1055	1051	4
B. PHYSICAL SCIENTISTS	2966	2922	44
C. ENVIRONMENTAL SCIENTISTS	173	167	6
D. MATHEMATICAL SCIENTISTS	200	195	5
E. LIFE SCIENTISTS	260	250	10
F. PSYCHOLOGISTS	7	7	0
G. SOCIAL SCIENTISTS	22	22	0
H. TOTAL (SUM OF A TO G)	4683	4614	69

ITEM 6 - FULL-TIME S&E, BY FIELD IN WHICH PRIMARILY EMPLOYED AND SEX, 1975

FIELD OF EMPLOYMENT	TOTAL	MEN	WOMEN
A. ENGINEERS (TOTAL)	5820	5776	44
(1) AERO. & ASTRO. ENGRS.	201	200	1
(2) CHEMICAL ENGINEERS	217	211	6
(3) CIVIL ENGINEERS	151	149	2
(4) ELECTRICAL ENGINEERS	6691	2680	11
(5) MECHANICAL ENGINEERS	1371	1360	11
(6) OTHER ENGINEERS	1189	1176	13
B. PHYSICAL SCIENTISTS (TOTAL)	4472	4282	190
(1) CHEMISTS	1247	1156	91
(2) PHYSICISTS	2884	2804	80
(3) OTHER PHYSICAL SCIENTISTS	341	322	19
C. ENVIRONMENTAL SCIENTISTS(TOTAL)	247	236	11
(1) EARTH SCIENTISTS	99	96	3
(2) ATMOSPHERIC SCIENTISTS	125	118	7
(3) OCEANOGRAPHERS	23	22	1
D. MATHEMATICAL SCIENTISTS (TOTAL)	1213	996	217
(1) MATHEMATICIANS	725	637	88
(2) COMPUTER SCIENTISTS	488	359	129
E. LIFE SCIENTISTS (TOTAL)	476	360	116
(1) AGRICULTURAL SCIENTISTS	0	0	0
(2) BIOLOGICAL SCIENTISTS	389	285	104
(3) MEDICAL SCIENTISTS	87	75	12
F. PSYCHOLOGISTS (TOTAL)	9	8	1
G. SOCIAL SCIENTISTS (TOTAL)	133	123	10
(1) ECONOMISTS	35	32	3
(2) SOCIOLOGISTS	2	1	1
(3) POLITICAL SCIENTISTS	9	8	1
(4) HISTORIANS	3	3	0
(5) OTHER SOCIAL SCIENTISTS	84	79	5
H. TOTAL (SUM OF A TO G)	12370	11781	589

ITEM 7 - GRADUATE STUDENTS RECEIVING COMPENSATION FOR PART-TIME SERVICES AS SCIENTISTS AND ENGINEERS, BY FIELD AND FUNCTION IN WHICH PRIMARILY ENGAGED; AND TOTAL FTE FUNCTION, 1975

FIELD OF EMPLOYMENT	TOTAL	TEACHING	R&D	OTHER S&E ACTIVITIES
A. ENGINEERS (TOTAL)	77	0	76	1
(1) AERO. & ASTRO. ENGRS.	0	0	0	0
(2) CHEMICAL ENGINEERS	14	0	14	0
(3) CIVIL ENGINEERS	1	0	0	1
(4) ELECTRICAL ENGINEERS	10	0	10	0
(5) MECHANICAL ENGINEERS	7	0	7	0
(6) OTHER ENGINEERS	45	0	45	0
B. PHYSICAL SCIENTISTS (TOTAL)	465	0	465	0
(1) CHEMISTS	162	0	162	0
(2) PHYSICISTS	178	0	178	0
(3) OTHER PHYSICAL SCIENTISTS	125	0	125	0
C. ENVIRONMENTAL SCIENTISTS(TOTAL)	57	0	57	0
(1) EARTH SCIENTISTS	9	0	9	0
(2) ATMOSPHERIC SCIENTISTS	35	0	35	0
(3) OCEANOGRAPHERS	13	0	13	0
D. MATHEMATICAL SCIENTISTS (TOTAL)	45	0	45	0
(1) MATHEMATICIANS	20	0	20	0
(2) COMPUTER SCIENTISTS	25	0	25	0
E. LIFE SCIENTISTS (TOTAL)	40	0	40	0
(1) AGRICULTURAL SCIENTISTS	0	0	0	0
(2) BIOLOGICAL SCIENTISTS	39	0	39	0
(3) MEDICAL SCIENTISTS	1	0	1	0
F. PSYCHOLOGISTS (TOTAL)	2	0	2	0
G. SOCIAL SCIENTISTS (TOTAL)	12	0	12	0
(1) ECONOMISTS	1	0	1	0
(2) SOCIOLOGISTS	1	0	1	0
(3) POLITICAL SCIENTISTS	0	0	0	0
(4) HISTORIANS	2	0	2	0
(5) OTHER SOCIAL SCIENTISTS	8	0	8	0
H. TOTAL (SUM OF A TO G)	698	0	697	1
I. FTE DISTRIBUTION	390	0	389	1

ITEM 8 - TECHNICIANS, BY FIELD AND FUNCTION IN WHICH PRIMARILY EMPLOYED, JANUARY 1975

FIELD OF EMPLOYMENT	TOTAL	R&D	OTHER ACTIVITIES
A. ENGINEERING TECHNICIANS	5079	5033	46
B. PHYSICAL SCIENCE TECHS	909	900	9
C. ENVIRONMENTAL SCIENCE TECHS	77	77	0
D. MATHEMATICS TECHNICIANS	623	623	0
E. BIO. & AGR. SCIENCE TECHS	106	106	0
F. MEDICAL & HEALTH-RELATED	316	316	0
G. PSYCHOLOGY TECHNICIANS	0	0	0
H. SOCIAL SCIENCE TECHS	19	19	0
I. TOTAL (SUM OF A TO H)	7129	7074	55

SOURCE: NATIONAL SCIENCE FOUNDATION

Appendix C

Reproduction of Covering Letter, Questionnaire, and Instructions

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

January 6, 1975

Dear Survey Participant:

The National Science Foundation requests your cooperation in its annual Survey of Scientific Activities of Institutions of Higher Education. I am enclosing a questionnaire on the employment of professional and technical personnel in the sciences and engineering, January 1975.

The survey questionnaire is virtually the same as that used last year. The question requesting a men-women break of full-time scientists and engineers by field of employment (item 6) is being continued in this survey at the request of the Association for Institutional Research (AIR).

Included in the package is a postcard that should be returned immediately upon receipt. It will assure us that the questionnaire has reached you and will provide the names of persons to be contacted if questions arise in the follow-up and editing phases of the survey. Please complete and return the questionnaire to us by March 31, 1975.

In previous surveys some academic officials questioned the applicability of the survey to their institutions, either because the institution (1) did not perform R&D activities or (2) did not grant degrees in the sciences or engineering. Please note that the survey universe covers all institutions, including 2-year institutions, that employ professional personnel for instructional or R&D activities in the sciences or engineering.

NSF recognizes that some of the data may have to be estimated by you. If institutional records do not yield the specific breakdowns requested in an item, please provide your best estimates for all the required detail.

Preliminary data for the January 1974 survey were published in October and a set of 47 selected tabulations with final data were released in December. A final report including analysis of the survey results is expected to be released early in 1975.

Your continued cooperation in providing a prompt response will greatly assist NSF in its efforts to compile and release the survey results on a timely basis. If you have any questions or if you would like a set of the 1974 survey tabulations, please contact me or Mr. Robert Loycano. We may be reached on Area Code 202, 282-7790.

Sincerely yours,

Richard M. Berry

Richard M. Berry, Study Director
Universities and Nonprofit
Institutions Studies Group
Division of Science Resources Studies

Enclosures

NSF FORM 724

OMB No. 99-R0282
Approval expires December 31, 1975

NATIONAL SCIENCE FOUNDATION
Washington D.C. 20550

SURVEY OF SCIENTIFIC ACTIVITIES OF INSTITUTIONS OF HIGHER EDUCATION

Employment of Professional and Technical Personnel in the Sciences and Engineering, January 1975

Organizations are requested to complete and return this form to:

NATIONAL SCIENCE FOUNDATION
1800 G Street, N.W.
Washington, D.C. 20550 Attn: UNISG

Name and address of institution:
(Please correct if name or address has changed)

This survey requests employment data as of January 1975. The completed 1975 questionnaire should be returned to NSF by March 31, 1975. Your cooperation in returning the survey questionnaire promptly is appreciated.

Please read the enclosed instructions before completing this form. If you have any questions about the completion of this form, **contact Robert Loycano (202-282-7790).** Where exact data are not available, use estimates. Please complete all items; estimates by college officials will be better than NSF estimates. Enter "0" as an item total (lines 2100, 2200, etc., are item totals) rather than leave the total blank.

All entries should be in whole numbers. Do not enter decimals or fractions.

Institutions of Higher Education

Include data for branches (including regional campuses) and all organizational units of your institution, such as a medical school or agricultural experiment station. Also include any hospital or clinic owned, operated, or controlled by the university, and integrated operationally with the clinical programs of your medical school. **Exclude** data for any Federally Funded Research and Development Centers (FFRDC's) administered by your institution. **(See below.)**

Please classify your institution according to (1) highest degree granted in the sciences or engineering and (2) primary administrative control.

Highest degree granted in the sciences or engineering during 1973-74	Check one	One field in which highest degree was awarded	Check primary administrative control of your institution	
Ph.D.	☐		Federal	☐
M.D., D.D.S., etc.	☐		State	☐
Master's	☐		Local	☐
Bachelor's or equivalent	☐		Private	☐
Degree other than in science or engineering	☐			
2-year program	☐			

Federally Funded Research and Development Centres (FFRDC's)

Separate forms have been mailed directly to all FFRDC's administered by academic institutions. A list of these Centers appears on page 2 of the Instructions and Definitions.

NSF FORM 724 (12-74)

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SECTION A. NUMBER OF SCIENTISTS AND ENGINEERS, JANUARY 1975

(Include postdoctorals; exclude graduate students)

Item 1. Full-time scientists and engineers, by field and function in which primarily employed (enter the totals of 1a - 1g in 1h); and total full-time equivalents (FTE), by function, January 1975 (enter in 1i)

FIELD OF EMPLOYMENT		TOTAL (1)	TEACHING (2)	R&D (3)	Other activities (4)
a. Engineers (total)	2110				
(1) Aeronautical & astronautical engineers	2111				
(2) Chemical engineers	2112				
(3) Civil engineers	2113				
(4) Electrical engineers	2114				
(5) Mechanical engineers	2115				
(6) Other engineers	2116				
b. Physical scientists (total)	2120				
(1) Chemists	2121				
(2) Physicists	2122				
(3) Other physical scientists	2123				
c. Environmental scientists (total)	2130				
(1) Earth scientists	2131				
(2) Atmospheric scientists	2132				
(3) Oceanographers	2133				
d. Mathematical scientists (total)	2140				
(1) Mathematicians (exclude computer scientists)	2141				
(2) Computer scientists (exclude programmers)	2142				
e. Life scientists (total)	2150				
(1) Agricultural scientists	2151				
(2) Biological scientists	2152				
(3) Medical scientists (see instructions, p.1)	2153				
f. Psychologists (total)	2160				
g. Social scientists (total)	2170				
(1) Economists	2171				
(2) Sociologists	2172				
(3) Political scientists	2173				
(4) Historians	2174				
(5) Other social scientists	2175				
h. Total headcount (sum of a to g) a/	2100				
i. FTE distribution, by function b/	2190				

Item 2. Full-time scientists and engineers, by highest earned degree and function in which primarily employed, January 1975

HIGHEST EARNED DEGREE		TOTAL (1)	TEACHING (2)	R&D (3)	Other activities (4)
a. Ph.D. or Sc.D. (excl. Ed.D., J.D., etc.) c/	2210				
b. M.D., D.D.S., D.V.M., etc.	2220				
c. Master's c/	2230				
d. Bachelor's or the equivalent	2240				
e. Total (sum of a to d) a/	2200				

a/ Totals in line 1h should be the same as the corresponding totals in line 2e.

b/ The total reported in item 1i, column 1, should, by definition, be the same as the total in item 1h, column 1. However, the FTE distribution by function (columns 2, 3, and 4) will not necessarily coincide with the functional distribution on a "primarily employed" basis in line 1h.

c/ Include in line 2c Ed.D's, J.D.'s, etc. if they are employed in the sciences or engineering.

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Item 3. Part-time scientists and engineers, by field and function in which primarily employed (enter the totals of 3a - 3g in 3h); and total FTE's by function, January 1975 (enter in 3i) (exclude graduate students).

FIELD OF EMPLOYMENT		TOTAL (1)	TEACHING (2)	R&D (3)	Other activities (4)
a. Engineers (total)	2310				
(1) Aeronautical & astronautical engineers	2311				
(2) Chemical engineers	2312				
(3) Civil engineers	2313				
(4) Electrical engineers	2314				
(5) Mechanical engineers	2315				
(6) Other engineers	2316				
b. Physical scientists (total)	2320				
(1) Chemists	2321				
(2) Physicists	2322				
(3) Other physical scientists	2323				
c. Environmental scientists (total)	2330				
(1) Earth scientists	2331				
(2) Atmospheric scientists	2332				
(3) Oceanographers	2333				
d. Mathematical scientists (total)	2340				
(1) Mathematicians (exclude computer scientists)	2341				
(2) Computer scientists (exclude programmers)	2342				
e. Life scientists (total)	2350				
(1) Agricultural scientists	2351				
(2) Biological scientists	2352				
(3) Medical scientists (see instructions, p. 1.)	2353				
f. Psychologists (total)	2360				
g. Social scientists (total)	2370				
(1) Economists	2371				
(2) Sociologists	2372				
(3) Political scientists	2373				
(4) Historians	2374				
(5) Other social scientists	2375				
h. Total headcount (sum of a to g) 1/	2300				
i. FTE distribution by function 2/	2390				

Item 4. Part-time scientists and engineers, by highest earned degree and function in which primarily employed, January 1975

HIGHEST EARNED DEGREE		TOTAL (1)	TEACHING (2)	R&D (3)	Other activities (4)
a. Ph.D. or Sc.D. (excl. Ed.D., D.B.A.) 3/	2410				
b. M.D., D.D.S., D.V.M., etc.	2420				
c. Master's 3/	2430				
d. Bachelor's or the equivalent	2440				
e. Total (sum of a to d) 1/	2400				

1/ Totals in line 3h should be the same as the corresponding totals in line 4e.

2/ The totals in item 3i (counting FTE status for part-time employment only) FTE's will not usually differ from headcount totals in line 3h.

3/ Include in line 4c, Ed.D., D.B.A., etc. if they are employed in the sciences or engineering.

Item 5. Scientists and engineers with doctorate degrees, by field in which primarily employed, January 1975 (include only Ph.D's and Sc.D's reported in items 2a and 4a. Exclude M.D., D.D.S. degrees, etc.)

FIELD OF EMPLOYMENT		TOTAL (1)	FULL TIME (2)	PART TIME (3)
a. Engineers	2510			
b. Physical scientists	2520			
c. Environmental scientists	2530			
d. Mathematical scientists	2540			
e. Life scientists	2550			
f. Psychologists	2560			
g. Social scientists	2570			
h. Total (sum of a to g) 1/	2500			

1/ 5h, column 2 must equal 2a, column 1; 5h, column 3 must equal 4a, column 1.

Item 6. Full-time scientists and engineers, by field in which primarily employed, and sex, January 1975. (Totals reported in item 6, column 1, should equal the totals reported in item 1, column 1.)

FIELD OF EMPLOYMENT		TOTAL (1)	MEN (2)	WOMEN (3)
a. Engineers (total)	2610			
(1) Aeronautical & astronautical	2611			
(2) Chemical engineers	2612			
(3) Civil engineers	2613			
(4) Electrical engineers	2614			
(5) Mechanical engineers	2615			
(6) Other engineers	2616			
b. Physical scientists (total)	2620			
(1) Chemists	2621			
(2) Physicists	2622			
(3) Other physical scientists	2623			
c. Environmental scientists (total)	2630			
(1) Earth scientists	2631			
(2) Atmospheric scientists	2632			
(3) Oceanographers	2633			
d. Mathematical scientists (total)	2640			
(1) Mathematicians (exclude computer scientists)	2641			
(2) Computer scientists (exclude programmers)	2642			
e. Life scientists (total)	2650			
(1) Agricultural scientists	2651			
(2) Biological scientists	2652			
(3) Medical scientists (see instructions, p. 1.)	2653			
f. Psychologists (total)	2660			
g. Social scientists (total)	2670			
(1) Economists	2671			
(2) Sociologists	2672			
(3) Political scientists	2673			
(4) Historians	2674			
(5) Other social scientists	2675			
h. Total headcount (sum of a to g)	2600			

SECTION B. NUMBER OF GRADUATE STUDENTS ENGAGED PART TIME AS SCIENTISTS AND ENGINEERS, January 1975. (Do not report postdoctorals here; include them in section A.)

Item 7. Graduate students receiving compensation for part time services as scientists and engineers at your institution, by field and function in which primarily engaged (enter the totals of 7a - 7g in 7h), and total FTE's, by function (enter in 7i), January 1975

FIELD OF EMPLOYMENT		TOTAL (1)	TEACHING (2)	R&D (3)	Other activities (4)
a. Engineers (total)	2710				
(1) Aeronautical & astronautical engineers	2711				
(2) Chemical engineers	2712				
(3) Civil engineers	2713				
(4) Electrical engineers	2714				
(5) Mechanical engineers	2715				
(6) Other engineers	2716				
b. Physical scientists (total)	2720				
(1) Chemists	2721				
(2) Physicists	2722				
(3) Other physical scientists	2723				
c. Environmental scientists (total)	2730				
(1) Earth scientists	2731				
(2) Atmospheric scientists	2732				
(3) Oceanographers	2733				
d. Mathematical scientists (total)	2740				
(1) Mathematicians (exclude computer scientists)	2741				
(2) Computer scientists	2742				
e. Life scientists (total)	2750				
(1) Agricultural scientists	2751				
(2) Biological scientists	2752				
(3) Medical scientists	2753				
f. Psychologists (total)	2760				
g. Social scientists (total)	2770				
(1) Economists	2771				
(2) Sociologists	2772				
(3) Political scientists	2773				
(4) Historians	2774				
(5) Other social scientists	2775				
h. Total headcount (sum of a to g)	2700				
i. FTE distribution, by function 1/	2790				

1/ The totals in item 7i converting figures on part time services into FTE's will necessarily differ from headcount totals in item 7h.

SECTION C. NUMBER OF TECHNICIANS EMPLOYED IN THE SCIENCES AND ENGINEERING, January 1975

Item 8. Technicians, by field and function in which primarily employed, January 1975

FIELD OF EMPLOYMENT		TOTAL (1)	R&D (2)	Other activities (3)
a. Engineering technicians	2810			
b. Physical science technicians	2820			
c. Environmental science technicians	2830			
d. Mathematics technicians (incl. computer programmers)	2840			
e. Biological and agricultural science technicians	2850			
f. Medical and health-related technicians	2860			
g. Psychology technicians	2870			
h. Social science technicians	2880			
i. Total (sum of a to h)	2800			

CHECK LIST

1. Are all entries rounded to whole numbers? (Do not enter fractions or decimals.)
2. Do the data add to subtotals?
3. Are all items completed? YOUR ESTIMATES will be better than none. Estimates may be noted on a separate sheet.
4. Are all branches and components such as a medical school and agricultural experiment station included?
5. Have you included all postdoctorals?

1974-1975 DATA CHECK

Please correlate your January 1975 personnel data with your response for January 1974, particularly for the following item totals. Please explain below or in a separate sheet any significant changes and where possible, indicate any required adjustments in data reported in previous surveys.

	1974	1975
Total full-time scientists & engineers	Line 2100, col. 1	Line 2100, col. 1
Total part-time scientists & engineers	Line 2300, col. 1	Line 2300, col. 1
Total graduate students engaged part-time as scientists & engineers	Line 2700, col. 1	Line 2700, col. 1
Total technicians employed in the sciences and engineering	Line 2800, col. 1	Line 2800, col. 1

CONFIDENTIALITY

Please indicate the number of any item that should not be published with your institution identified.

ITEM

REMARKS

PLEASE TYPE OR PRINT

NAME OF PERSON SUBMITTING THIS FORM	TITLE	AREA CODE	EXCH.	NO.	EXT.
NAME OF PERSON WHO PREPARED THIS SUBMISSION (If different from above)	TITLE	AREA CODE	EXCH.	NO.	EXT.

NAME OF INSTITUTION	DATE	ADDRESS (number, street, city, State, ZIP code)

NSF Form 724 (12-74)
Instruction sheet

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D. C. 20550

SURVEY OF SCIENTIFIC ACTIVITIES OF INSTITUTIONS OF HIGHER EDUCATION

Employment of Professional and Technical Personnel in the Sciences and Engineering, January 1975

INSTRUCTIONS AND DEFINITIONS

The National Science Foundation requests your cooperation in completing the attached questionnaire covering the personnel characteristics of your institution as they relate to the sciences and engineering. This form requests employment data as of January 1975. The questionnaire should be completed and returned to NSF by **March 31, 1975**.

This survey is comparable to that conducted by this office for last year, which included manpower as of January 1974. Where data reported in the current survey differ significantly from those reported in the previous survey, please indicate the reasons for the difference, such as "opening of new medical school," etc., at the end of the questionnaire or on a separate sheet of paper.

If you have any questions regarding information requested on this form, write or telephone Mr. Robert Loycano at the Universities and Nonprofit Institutions Studies Group, Division of Science Resources Studies, National Science Foundation, 1800 G Street, N. W., Washington, D. C. 20550 (Telephone: 202-282-7790). Additional forms, as well as copies of previous responses, may be obtained by writing to the above address.

Institutions of Higher Education

Academic institutions should include in the form for the parent institution date on professional and technical personnel employed in the sciences and engineering in all branches and other units of the parent institution, *including* regional campuses, medical school, or an agricultural experiment station, but *excluding* an associated Federally Funded Research and Development Center (FFRDC). FFRDC's are to report their data separately from the administering university.

Include all personnel who were paid a salary or stipend, including *postdoctorals*, and other staff, such as members of religious orders, who received no remuneration while employed at the institution.

Exclude: (1) personnel on sabbatical or other leave status; (2) personnel employed in branches of your institution located in foreign countries; (3) voluntary workers; (4) student health service personnel.

Medical Schools

Incorporate data for medical schools in the data for the parent institution. Medical schools are those two- or four-year schools of medicine approved by the Council on Medical Education and Hospitals and the Association of American Medical Colleges, including (1) teaching and R&D functions of hospitals or clinics owned, operated, or controlled by universities and integrated operationally with the clinical programs of their medical schools; (2) research bureaus or institutes which are integral parts of medical schools; (3) research bureaus and institutes which are nonuniversity owned but are affiliated with the medical school and any university bureaus and institutes which may be outside the departmental structure of universities but whose senior research staff members hold teaching appointments with medical schools.

Personnel employed at such organizations that are to be reported in the survey include: physicians (residents and nonresidents), dentists, public health specialists, pharmacists, *etc.*, who spend the greatest proportion of their time in teaching, clinical investigation, or other R&D activities.

Exclude: (1) all medical practitioners who spend the greatest proportion of their time providing patient care, dispensing drugs or services, or in diagnosis, etc.; (2) scientists whose primary employment is at independent hospitals even though they may perform some teaching or research functions for your institution through cooperative agreements; (3) interns; (4) nurses; (5) unpaid voluntary staff at medical or dental schools.

Federally Funded Research and Development Centers

For purposes of this survey, FFRDC's are defined as: R&D organizations exclusively or substantially financed by the Government, and administered on a contractual basis by educational institutions or other organizations. The following is a current list of FFRDC's administered by universities and colleges:

Ames Laboratory
Applied Physics Laboratory
Argonne National Laboratory
Brookhaven National Laboratory
Center for Naval Analyses
Cerro Tololo Inter-American Observatory
E. O. Lawrence Berkeley Laboratory
E. O. Lawrence Livermore Laboratory
Jet Propulsion Laboratory
Kitt Peak National Observatory
Lincoln Laboratory
Los Alamos Scientific Laboratory
Fermi National Accelerator Laboratory
National Astronomy and Ionosphere Center
National Center for Atmospheric Research
National Radio Astronomy Observatory
Oak Ridge Associated Universities
Ordnance Research Laboratory
Plasma Physics Laboratory
Space Radiation Effects Laboratory
Stanford Linear Accelerator Center

Data Elements Required to Complete This Survey

If the following seven characteristics are known for each science and engineering employee, the request can be completed without estimates. The characteristics are further described elsewhere in the instructions.

1. Scope of personnel included.
   a. Scientists and engineers
   b. Science and engineering graduate students
   c. Science and engineering technicians
2. Assignment status:
   a. Full time
   b. Part time
3. Field of employment (23 fields in 7 groupings)
4. Full-time equivalent (FTE)
5. Function:
   a. Teaching
   b. Research and development
   c. Other science and engineering activities
6. Highest earned degree:
   a. Ph.D. or Sc.D.
   b. M.D., D.D.S., D.V.M., etc.
   c. Master's
   d. Bachelor's or its equivalent
7. Classification of scientists and engineers by sex.

Classification of Fields of Employment in the Sciences and Engineering

Listed below are the broad and detailed fields of employment corresponding to the fields shown on the questionnaire with illustrative disciplines in each field.

Please classify persons (including those employed in interdisciplinary or multidisciplinary specializations) in the listed fields with which their activities (teaching, research, or other) are most closely identified. In the case of a scientist employed in a general category such as science education he should be reported in the field most

All entries should be in whole numbers; do not enter decimals or fractions. Detail should add to totals.

closely related to the academic requirements of his position — such as mathematics, sociology, or psychology.

It is recognized that because of the importance of academic departments in the organizational structure and, thus, in the information system of institutions of higher education, many institutions must report individuals in terms of the departmental assignment shown in the personnel information system. In some instances, the designated department will not necessarily be the same as the field in which an individual is actually employed.

ENGINEERING

Aeronautical and astronautical: aerodynamics, aerospace, space technology
Chemical: ceramic, petroleum, petroleum refining, process
Civil: architectural, hydraulic, hydrologic, marine, sanitary and environmental, structural, transportation
Electrical: communication, electronic, power
Mechanical: engineering mechanics
Other engineering: agricultural, industrial and management, metallurgical and materials, mining, nuclear, ocean engineering systems, textile, welding

PHYSICAL SCIENCES

Chemistry: analytical, inorganic, organo-metallic, organic, pharmaceutical, physical, polymer science (exclude biochemistry)
Physics: acoustics, atomic and molecular, condensed matter, elementary particles, nuclear structure, optics, plasma
Other physical sciences: astronomy (laboratory astrophysics, optical astronomy, radio astronomy, theoretical astrophysics, X-ray, gamma-ray, neutrino astronomy), metallurgy

ENVIRONMENTAL SCIENCES (terrestrial and extraterrestrial)

Earth sciences: engineering geophysics, general geology, geodesy and gravity, geomagnetism, hydrology, inorganic geochemistry, isotopic geochemistry, organic geochemistry, lab geophysics, paleomagnetism, paleontology, physical geography and cartography, seismology, soil sciences
Atmospheric sciences: aeronomy, solar, weather modification, extraterrestrial atmospheres, meteorology
Oceanography: biological oceanography, chemical oceanography, geological oceanography, physical oceanography, marine geophysics

MATHEMATICAL SCIENCES:

Mathematics: algebra, analysis, applied mathematics, foundations and logic, geometry, numerical analysis, statistics, topology
Computer science: computer programming;[1] computer and information sciences (general); design, development, and application of computer capabilities to data storage and manipulation; information sciences and systems; systems analysis

LIFE SCIENCES

Agricultural sciences: agronomy, animal science, dairy science, food science and technology, forestry, horticulture, poultry science
Biological sciences: anatomy, bacteriology, biochemistry, biogeography, biophysics, ecology, embryology, entomology, evolutionary biology, genetics, immunology, microbiology, nutrition and metabolism, parasitology, pathology, pharmacology, physical anthropology, physiology, plant sciences, radiobiology, systematics
Medical sciences: Internal medicine, neurology, ophthalmology, preventive medicine and public health, psychiatry, radiology, surgery, veterinary medicine, dentistry, physical medicine and rehabilitation, pharmacy, podiatry

PSYCHOLOGY: animal behavior; clinical psychology; comparative psychology, counseling and guidance; development and personality; educational, personnel, vocational psychology and testing; experimental psychology; ethology; industrial and engineering psychology; social psychology

SOCIAL SCIENCES

Economics: agricultural economics; econometrics and economic statistics; history of economic thought; international economics; industrial, labor and agricultural economics; macroeconomics; microeconomics; public finance and fiscal policy; theory; economic systems and development
Sociology: comparative and historical, complex organizations, culture and social structure, demography, group interactions, social problems and social welfare, sociological theory
Political science: area or regional studies, comparative government, history of political ideas, international relations and law, national, political and legal systems; political theory, public administration
History
Other social sciences: cultural anthropology, linguistics, socioeconomic geography, and research in education

[1] Personnel employed as computer programmers should be reported as technicians (item 8).

Section A—Number of Scientists and Engineers, January 1975

(Includes postdoctorals; excludes graduate students)

(Note: Figures on graduate students engaged part time as scientists and engineers should be reported in Section B)

This section requests data on full-time and part-time employed scientists and engineers. Scientists and engineers include faculty members, postdoctorals, and other professionals (at a level at which the knowledge acquired by academic training equal to a bachelor's degree is essential in the performance of duties) working in the sciences and engineering at your institution, including those in research administration.

Two of the most common methods used to determine whether an individual is employed full time are: (1) working 40 hours per week; (2) teaching 12 credit hours per week. (The preceding serve as illustrations only; the "full-time" workload may vary somewhat from institution to institution.)

Item 1. Full-time scientists and engineers, by field and function in which *primarily* employed, January 1975.

In items 1a to 1h, the functional classification of professional personnel into teaching (column 2), R&D (column 3), and other science and engineering activities (column 4), should be based on the function in which the person is primarily engaged or employed at the institution. For example, a person engaged in two or all three of the specified functional categories should be classified in the function in which he spends the largest proportion of his time. Exclude outside consulting work and teaching not performed under the auspices of your institution.

In classifying personnel by function, note that determinations made solely on the basis of job titles may produce a significant bias, primarily toward teaching. Persons with professorial rank may also be engaged in research. Among the factors that may be considered in determining the primary function of an individual are both his "separately budgeted" R&D assignment *and* his estimated departmental research workload.

In classifying an individual under a particular category (teaching, research and development, or other science and engineering activities), take into consideration all official activities even if carried on in a school or department other than the one in which he holds his principal appointment.

Teaching (column 2) is defined as encompassing those activities connected with degree-credit courses or which are intended to lead ultimately to the granting of degrees or certificates or to professional certification or licensing. Included are such functions as instruction and training performed in connection with degree-credit courses and the administration of such instruction and training.

Include under "teaching" any academic administrator such as the President, a Dean, a Department Chairman, who holds a science or engineering degree, unless the individual is primarily involved in the administration of R&D activities. If the individual cannot be identified with one specific discipline, report the field of his highest earned degree. Administrators primarily involved in R&D activities should be reported in the "R&D" column.

Include instruction of interns, residents, and other professional personnel receiving advanced training such as postdoctoral fellows or trainees.

Time spent by faculty or other staff members in supervising the thesis work of graduate students is considered to be part of the teaching function.

Exclude instructors in nursing, dental hygiene, etc.

Research and development (column 3) include basic and applied research in the sciences and in engineering, and design and development of prototypes and processes.

Research is a systematic, intensive study directed toward fuller knowledge of the subject studied. Included in this function is the preparation for publication of books and papers describing the results of the specific research and development, if carried out as an integral part of that research and development. Also *included* is the *administration* of research and development.

Development is the systematic use of knowledge directed toward the design and production of useful prototypes, materials, devices, systems, methods, or processes. It does not include quality control or routine product testing.

Under *other science and engineering activities* (column 4) report all professional personnel not primarily employed in teaching or research and development, as defined above. Examples of such activities are agricultural demonstration work; adult education (if not degree credit); dissemination of scientific information; student counseling by individuals with a degree in psychology. *Exclude* hospital employees predominantly involved in patient services, Student Health Service professionals, and other individuals that are not primarily engaged in science or engineering activities. *Do not use* this category to report individuals for which there is difficulty in determining their primary function. It is preferable that you classify each person in the most appropriate functional category according to your best estimate.

Full-time equivalent distribution, by function. In line 1i, apportion staff members across the three functions on the basis of the proportion of effort or time spent in each of the functions, thus correcting for the "primarily engaged" headcount data reported in line 1h. For example, an individual devoting three-fourths time to teaching and one-fourth to research and development should be counted as 0.75 in teaching and 0.25 in research and development. The FTE values should be cumulated for each function. This sum should then be *rounded to the nearest whole number* before entering the number on the questionnaire. In item 1i, figures entered in columns (2), (3), and (4) should add to the total in column (1).

Item 2. Full-time scientists and engineers, by highest earned degree and function in which *primarily* employed, January 1975.

For the purposes of this survey, earned degrees are classified in four categories as defined below:

a. "Ph.D. or Sc.D." degrees include all such earned degrees. Include individuals holding both the Ph.D. (or Sc.D.) degree and a first-professional degree, such as the M.D. Exclude persons who hold an Ed.D. or J.D. degree.

b. "M.D., D.D.S., D.V.M., etc." includes individuals whose highest earned degrees are first-professional medical degrees that indicate the completion of the academic requirements based on programs that require at least two academic years of previous college work for entrance and require a total of at least six academic years of college work for completion. Specifically, include in line 2b first-professional degrees in medicine (M.D.), Dentistry (D.D.S. or D.M.D.), Veterinary Medicine (D.V.M.), Chiropody or Podiatry (D.S.C. or D.P.), Optometry (O.D.), and Osteopathy (D.O.). Individuals holding both the Ph.D. (Sc.D.) degree and a first-professional degree, such as the M.D., should be included in line 2a as mentioned in (a) above.

c. "Master's" degrees include all degrees above the bachelor's and first-professional degree and other than the Ph.D., Sc.D., M.D., D.D.S., and other degrees reported in lines 2a and 2b. Include persons who hold an Ed.D. or J.D. degree.

d. "Bachelor's or the equivalent" include all individuals whose highest earned degree is the bachelor's degree or a four- or five-year first-professional degree, or who have the equivalent in experience, even if they have not earned such a degree (line 2d).

Item 3. Part-time scientists and engineers, by field and function in which *primarily* employed, January 1975.

Instructions for item 1a-1h relating to classification by field and function also relate to part-time professional staff in item 3.

In estimating the full-time equivalents of part-time personnel in item 3i,[2] take into account both the overall workload and the proportion of time spent on each of the three functions of activity. For example, if the full-time workload were 40 hours per week, and an individual were estimated to spend 10 hours on teaching and related duties and 6 hours on research, his FTE values would be: Teaching — .25 (10/40); R&D — .15 (6/40). The FTE values should be cumulated for each function and *rounded to the nearest whole number* before entering the number on the questionnaire. The FTE values entered in columns (2), (3), and (4) should then be summed to arrive at the total to be entered in column (1).

[2] These instructions also apply to the reporting of FTE values of graduate students engaged part time as scientists and engineers (item 7i).

Item 4. Part-time scientists and engineers, by highest earned degree and function in which *primarily* employed, January 1975.

Instructions for item 2 relating to the classification by field and highest earned degree also relate to part-time professional staff in item 4.

Item 5. Scientists and engineers with doctorate degrees, by field in which *primarily* employed, January 1975.

Include only Ph.D.'s and Sc.D.'s reported in items 2a and 4a. Exclude Ed.D., J.D., M.D., D.D.S. degrees, etc. The total number in item 5h, column 2 should equal the number shown in item 2a, column 1; the total number in item 5h, column 3 should equal the number shown in item 4a, column 1.

Item 6. Full-time scientists and engineers, by field in which *primarily* employed and sex, January 1975.

Institutions are requested to report total full-time scientists and engineers, by sex and field in which *primarily* employed. Data in column 1 (total of men and women) should equal data shown in item 1, column 1.

Section B—Number of Graduate Students Engaged Part Time as Scientists and Engineers

Item 7. Graduate students receiving compensation for part-time services as scientists and engineers at your institution, by field and function in which primarily engaged, January 1975.

Include all graduate students who are enrolled in a course of study designed to lead to an advanced degree in the sciences or engineering and *who also receive compensation* from your institution for part-time professional services performed in the sciences or engineering. This category includes (a) graduate students receiving salaries or wages for their services as teaching assistants or research assistants, teaching associates, research associates, and (b) graduate students receiving other financial aid that requires the performance of professional services in the sciences or engineering at your institution. Exclude graduate students receiving nonduty stipends and others who may be engaged in scientific and engineering activities on a voluntary basis.

Instructions for item 1a-1h regarding classification by field and function may be used in classifying graduate students in item 7a-7h.

Instructions for item 3i, relating to full-time equivalents (FTE) of part-time professional staff, by function, also relate to graduate students in item 7i.

Section C—Number of Technicians Employed in the Sciences and Engineering

Item 8. Technicians, by field and function in which primarily employed, January 1975.

Technicians *include* all persons employed in positions which involve technical work at a level requiring knowledge in any of the fields of engineering, mathematics, physical sciences, environmental sciences, life sciences, psychology, or social sciences comparable to that acquired through formal post-high school training (less than a bachelor's degree), such as that obtained at technical institutes and junior colleges or through equivalent on-the-job training or experience. All personnel performing the duties described above should be reported as technicians even if they hold a bachelor's or higher degree. Some typical job titles include laboratory technician or assistant, physical science aide, engineering aide, statistical aide, draftsman, and computer programmer.

Do not include graduate students who were reported in item 6. Also *exclude* craftsmen such as electricians, carpenters, machinists, etc. In the case where undergraduate students, juniors or seniors, are employed in R&D activities, they may, where applicable, be included as technicians.

Other Science Resources Publications

REPORTS	NSF No.	Price
Reviews of Data on Science Resources, No. 27, "Education and Work Activities of Federal Scientific and Technical Personnel, January 1974"	76-308	$0.40
Detailed Statistical Tables. Engineers: By Field. The 1972 Scientist and Engineer Population Redefined. Volume 2. Labor Force and Employment Characteristics	76-306	——
Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1974	76-305	$1.80
Reviews of Data on Science Resources, No. 26, "Energy and Energy-Related R&D Activities of Federal Installations and Federally Funded Research and Development Centers: Funds, FY 1973-75 (est.) and Manpower, Jan. 1973-75 (est.)	76-304	$0.35
Reviews of Data on Science Resources, No. 25, "Doctoral Scientists and Engineers in Private Industry, 1973"	76-302	$0.35
Projections of Degrees and Enrollment in Science and Engineering Fields to 1985	76-301	$1.15
Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1974, 1975, and 1976, Volume XXIV	75-334	$1.80
Characteristics of the National Sample of Scientists and Engineers, 1974. Part I. Demographic and Educational	75-333	$1.90
An Analysis of Federal R&D Funding by Function, Fiscal Years 1969-1976	75-330	$1.80
The 1972 Scientist and Engineer Population Redefined. Volume 2. Labor Force and Employment Characteristics	75-327	$2.65
Detailed Statistical Tables. Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1974	75-325	——

Reports	NSF No.	Price
Detailed Statistical Tables. Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1974, 1975, and 1976, Volume XXIV	75-323	——
The 1972 Scientist and Engineer Population Redefined. Volume 1. Demographic, Educational, and Professional Characteristics	75-313	$3.70
Reviews of Data on Science Resources, No. 23, "R&D Expenditures of State Public Institutions, Fiscal Year 1973"	75-311	$0.35
Reviews of Data on Science Resources, No. 24, "Work Activities of Employed Doctoral Scientists and Engineers in U.S. Labor Force, July 1973"	75-310	$0.65
R&D Activities of Independent Nonprofit Institutions, 1973	75-307	$1.15
Research and Development in State Government Agencies, Fiscal Years 1972 and 1973	75-303	$1.80
HIGHLIGHTS		
"Academic R&D Spending Up 12 Percent in FY 1975"	76-307	——
"Industrial R&D Expenditures Rise to $22 Billion in 1974"	76-300	——
"Graduate Science Enrollment in Fall 1975 is Up Again for Second Stright Year"	75-335	——
"National Sample of Scientists and Engineers: Median Annual Salaries, 1974"	75-332	——
"National Sample of Scientists and Engineers: Participation in National Programs and Changes in Educational Attainment, 1972-74"	75-317	——
"Racial Minorities in the Scientist and Engineer Population"	75-314	——
"National Sample of Scientists and Engineers: Changes in Employment, 1970-72 and 1972-74"	75-309	——